The Canadian
Medical Association Journal

Vol. XIII TORONTO, OCTOBER, 1923 No. 10

WHAT OF THE FUTURE OF SURGERY?*

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IT is one of the frailties and conceits to which our nature is heir that man is ever prone to consider his present attainments to be the culmination of human effort, the summit of achievement, above and beyond which it is scarcely likely that great progress may be expected by those who come after him. Yet an historical survey of any field of human endeavour shows that such a view has usually proved to be baseless. In spite of periods of darkness and retrogression, due to the chaos of political, social and economic upheavals, the general trend has been forward. Doubtless an exception is found in the creations of man's imaginative nature, in literature and the arts. Homer, Phidias, Praxitiles, Raphael, Michael Angelo, Velasquez, Goethe, Shakespeare may not be disparaged by comparison with later men of genius; rather do they loom larger in perspective as the centuries pass. But where progress depends on man's control over the forces of nature, it appears inevitable and certain that no end may be assigned.

Does this apply to the science and art of surgery? So vast has been the progress in this field during the period covered by still living men, so final do many of its accomplishments seem, that a disciple may be pardoned for some scepticism as to the extent of further progress. A brief review of the chief factors which have contributed to the building of the edifice of modern surgery may help us to clarify our ideas as to the future.

*Address delivered before the Annual Meeting of the Medical Society of Nova Scotia, at Windsor, N. S., July 4, 1923.

Doubtless in pre-historic, and certainly in the earliest historic times, in communities of men, individuals were appointed or constituted themselves as especially qualified in the exercise of the healing art. More often than not this was associated with religious observances, and priest and healer were often identical. It is not unreasonable to suppose that even then there may have been some differentiation of physician and surgeon; that one individual more bold or hardy than another may have assumed the duty of extracting weapons from the bodies of those injured in battle, or of binding up wounds, or perhaps of completing in rude fashion the amputation of nearly severed limbs, while another may have cultivated or sought for medicinal herbs and compounded potions or balms, or by the exercise of mystic rites have anticipated the psychotherapy of to-day. Certainly, wherever the physically afflicted were ministered to, the measures employed may have corresponded to those recognized to-day as medical on the one hand and surgical on the other.

In ancient Egyptian civilization it appears that physicians were numerous and active, and specialism was clearly recognized, as according to Herodotus, a physician was wont to confine himself to the treatment of a single disease. That surgery was practiced is told by hieroglyphics and by ample evidence from tombs and mummies themselves. In the British Museum may be seen a mummy with a fracture of the forearm, with anterior and posterior splints applied in no inexpert manner. Among the Greeks medicine

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flourished, and anyone who fancies that most of the accepted practice of the present is modern in origin should examine the writings of Hippocrates, and marvel at the accurate descriptions of the mechanism of fractures and dislocations, the prevision of asepsis in the injunction to the surgeon to use only clean water or wine in the cleansing of wounds, and to cleanse his hands thoroughly before touching the parts, and the account of the healing of wounds by first or by second intention. The surgeon was an honoured and essential participant in the conduct of war, as many passages from Homer attest.

In Roman civilization the healing art, as described by Celsus and by Galen, was chiefly in the hands of Greeks, and this identification with a conquered people injured the social prestige of the practitioner, who was frequently a slave. Nevertheless, the surgery of traumatisms flourished, doubtless on account of the almost constant state of warfare in which the Romans lived, and the technical aspect of surgery was probably advanced, as witnessed by the finding of over two hundred different surgical instruments in the ruins of Pompeii. Galen, who flourished in the second century, through his teachings and writings dominated the medical thought of Europe contemporaneously and for centuries later.

During the decline and after the fall of the Roman Empire, through the Dark Ages, medical learning was almost totally in abeyance, in common with other intellectual interests. Its traditions were preserved in two ways:—by the Arabs, who brought it back to Europe through the invasion of Spain, and by the monks in whose custody remained almost all the learning which survived from the classical period to the Renaissance. Surgery especially suffered in its repute because the monks were forbidden its practice, and it fell into the hands of the barbers, whose duty it was to shave and bleed them. Thus began the long period of degradation of surgery, which was practiced by barbers, bath-keepers, itinerant quacks and ne'er-do-wells. Naturally a definite schism developed between the physicians and surgeons; the latter were made inferior by papal and royal decree, and became little better than menials in the barbaric state of society which was Europe in the Dark Ages. Here and there appeared a man of intellectual ability and high character, developed into a surgeon by his humanitarian instincts in the cruel school of war, who naturally looked down on the barber-surgeon and sought recognition from his medical colleagues, only to be denied the privileges to which his accomplishments entitled him.

With the Renaissance came, as in other intellectual fields, a rebirth of the healing art. Vesalius, who flourished in the middle of the 16th century, is the central figure of this period; by his magnetic personality, his learning and his enthusiasm he was able to make the study of anatomy a pursuit of respectability and distinction instead of one which laboured under the displeasure of Church and State; he made researches in the physiology of the living, and accurate observations in pathology and in the clinical manifestations of disease. With his pupils, among whom were Eustachius and Fallopius, he substituted for the traditional dogma of Galen a practice based on the scientific method. Contemporaneous with him was one of the greatest surgeons of all time, Ambroise Paré, who, beginning as a barber's apprentice, became an army surgeon, acquired an enormous experience, and by dint of independent observation and reasoning broke away from many of the existing barbarous and futile methods of treating wounds, made use of the ligature in amputations, invented many surgical instruments, trusses and artificial limbs, and better than all, made himself so beloved and respected that his teachings were widely accepted.

Surgery now began to attract men of greater ability and influence and their claims to equal recognition with their medical colleagues were gradually crowned with success, though the 17th century found them still considered to be inferior. William Harvey, refusing to bow to the dogma which had been accepted for fourteen hundred years, proved by animal experimentation the truth about the circulation of the blood; the invention of the microscope at about this time enabled Malpighi to see the capillaries, and throughout the field of medicine exact observation, experimentation and logic succeeded to tradition and authority. Naturally the change was slow, especially in the field of surgery; the old rivalries, jealousies and intrigues between physicians, surgeons, and

barbers continued, and surgery widened its sphere but little.

The 18th century brings the commanding figure of John Hunter, whose versatility included original research in comparative anatomy and physiology, and in experimental pathology. The new surgical procedures which he introduced were reasoned out from experimental data based on human dissection and animal vivisection, and from keen clinical observation. He may truly be said to have established surgery on a sound scientific basis, instead of permitting it to remain a mere mechanical method of treatment. Contemporaneous with him were Morgagni, who by the study of pathological anatomy correlated clinical symptomatology with the organic tissue change which underlies it, and Edward Jenner the discoverer of preventive inoculation.

The 19th century brings us to a period so recent that comment is almost superfluous. Until nearly the middle of the century, conditions changed but gradually. Surgery having become a component part of scientific medicine, the distinction between the sister branches largely disappeared. As in the halcyon days of the classic Greek period, the student of the healing art received exactly the same education in the underlying medical sciences whatever his ultimate aim in practice. He whose temperament led to bold and decisive action, who carried part of his education in his finger tips, and whose nature could be steeled to bear to inflict pain, turned to surgery, but he always remained also a physician. And surgery had still little enough to offer to the patient; the reduction of fractures and dislocations, amputations for trauma or gangrene, incision of abscesses, ligation of vessels for haemorrhage or aneurysm, the removal of external tumors, cutting for stone, herniotomy and the rare and frequently fatal invasion of the peritoneal cavity for ovarian tumor or Caesarean section. Though McDowell performed his first ovariotomy in 1809, laparotomy was almost unknown, and considered usually indefensible. With no agents except opium and alcohol to narcotize the patient, every operation meant the infliction of suffering comparable only to the tortures of the Inquisition or of savages; every consideration was sacrificed to speed. Add to this the practically inevitable wound suppuration, and the frequent incidence of the four curses of pre-antiseptic days, septicemia, pyemia, erysipelas, and hospital gangrene, and what wonder is it that surgery was a last resort, offered only in cases of dire necessity, and then only in a very limited field of surgery as we know it now?

Of the introduction of inhalation anaesthesia by Morton and Warren at the Massachusetts General Hospital, and of the development and application of Pasteur's discovery by Lister to secure surgical antisepsis, and of the subsequent development of asepsis, it is necessary only to make mention before this audience, to whom the stirring story is so familiar. Pain was abolished, surgical wound infection vanquished, and the field of surgery rapidly extended. The urgent lesions of the abdominal, craniovertebral and thoracic cavities were attacked with success. The study of what has been aptly called by Moynihan the "pathology of the living" on the operating table, together with amazing advances in physiology, pathology, bio-chemistry and in means of diagnosis by instruments of precision have brought innumerable lesions from the borderland into the field of surgery. It is indeed a far cry from the barber surgeon of the Middle Ages to his successor of to-day who is admittedly the chief agent of the art of healing in bringing to suffering humanity direct, concrete, and often permanent relief and cure of its ills. It is no extravagant statement to say that surgery is the chief and most important therapeutic agent which the science and art of medicine possesses, and to its credit may be placed a saving of human life comparable to the work of inoculation, hygiene, and preventive medicine. The fact is that the distinction between surgeon and physician is often too sharply drawn both by the profession and the public; the two should be regarded as identical in the scientific foundation of their knowledge and in their viewpoint; divergence comes only in the application of a therapeutic method. Indeed the physician who practices paracentesis of pleura, pericardium, neural canal, abdomen and joints, who compresses the diseased lungs by creating a pneumothorax, or divides intra-pleural adhesions, or aids diagnosis by injecting air into the peritoneal cavity, or bleeds his patient, or performs transfusion, or administers intravenous therapy, is using methods essentially surgical in their character,—while on the other

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hand, the surgeon constantly borrows from the practice of the physician. No human mind can have a working knowledge of the whole field of modern medical science, but the surgeon must be at least as familiar as the physician with the anatomy, pathology, and pathological physiology which underlie the conditions which he treats, and also with their clinical phenomena. Because of the exaction on his time and strength by the therapeutic method he employs, he cannot keep himself fully in touch with progress in purely medical fields, but even here the more he is able to do so the more effective he will be. The surgeon who stands by the operating table knife in hand and says to the patient's physician, "Tell me what you wish me to do and I will do it," is not a surgeon but merely a surgical technician; yet there are men who are willing to play this rôle as well as physicians who encourage them to do so. The one is as truly a descendant of the barber surgeon as is the other the heir to the pompous, pedantic and complacent physician of the 17th century depicted by Molière.

What is, then, the present status of surgical science, and what the probabilities of future advance? Consider the factors which have brought surgery to its present state of development, and inquire whether each is likely to progress. Omitting from consideration the underlying sciences, the three great factors have been anaesthesia, the control of infection, and the development of the surgeon's armamentarium; instruments for the control of bleeding, for the exposure of deep-lying organs, special and diagnostic instruments of all sorts. It is hard for us now to realize how recently the control of haemorrhage was a cause of anxiety in almost every operation; how impossible was the execution of many now common procedures without the special instruments recently devised.

Anaesthesia is not a closed chapter; constant improvement is being made in the use of old and tried agents, and new methods are constantly being introduced; but it is a fair statement that it has reached a high state of perfection. With ether, nitrous oxide and oxygen, ethylene and chloroform, with administration by inhalation, by injection into the rectum, or by direct introduction into the circulation; with practically non-toxic substances for injection locally or into nerve trunks or the spinal canal, we have at our command methods which enable us to carry out almost any surgical procedure without anxiety lest the anaesthesia itself will cause disaster. Doubtless the ideal anaesthetic remains to be discovered; it will probably be a harmless substance taken by mouth or injected into the circulation, and inducing a natural sleep without ill after results; but in view of the fact that under well conducted nitrous oxide-oxygen anaesthesia the patient may be subjected to a three or four hour operation without serious ill effects,—in other words, for as long as a surgeon can work with skill, patience and success—it seems unlikely that any new development in the field of anaesthesia will widen very greatly the field of surgery.

The factor of asepsis is in all probability a fixed one. Omitting the chance of error through human fallibility, it is apparent that a clean operation can now be conducted about as aseptically as will ever be possible. Antisepsis, however, is a different matter. The ideal antiseptic, bactericidal, but non-toxic to human tissues, still elusively avoids discovery, but greater approximation to this ideal is constantly being made, and when found, the effectiveness of surgery will be greatly increased, though its application will not necessarily be much widened.

Of the third factor, the surgeon's armamentarium, it is not necessary to speak at length. Human ingenuity will continue to improve the physical means of diagnosis and treatment, and experience will continue to develop the technique of the operator, so that operative mortality will be lowered and the field of surgery extended.

Mention must be made of another matter in this connection which constitutes the most serious and yet the most easily remediable handicap to the success of surgery,—namely, delay in resorting to its aid. Every surgeon knows, and every physician should realize, that in the overwhelming majority of instances the success or failure of the former depends on early and prompt operation. All three participants in the all too common tragedy of disaster through delay may not be without blame; the patient, because he fears what inquiry will reveal and procrastinates in seeking advice, or listens to the plausible cajoleries of those who

practice the pseudo-medical cults; the physician, because he is careless or casual in his examination of the patient or is not prompt in seeking consultation; and the surgeon, if he fails to exercise every precaution and expedient to establish a diagnosis and safeguard his work. The remedies for these faults need no discussion.

Looking at the present status of our art, it is possible perhaps to hazard some predictions as to future progress. It is now technically possible for the surgeon to remove any one of the organs of the body not absolutely essential to life, and where such essential organ exists as a paired viscus, one member of this pair may be sacrificed. There appears to be little hope that these vital structures may be substituted for by transplantation from animals, since the tissues of animals, or even of other human beings inevitably, with a few apparent exceptions, have undergone solution when transplanted. Possibly biochemistry may solve the problem of rendering our tissues receptive to homogeneous or heterogeneous transplantation, but it seems unlikely.

Further progress, based on increasing knowledge of normal and pathological physiology, and on improved operative technique will continue to be made in all existing branches of our science. The surgery of the thoracic viscera is but in its infancy, and we may confidently expect to see the removal of portions or the whole of a diseased lung with a mortality much less than the now prevailing one of about 50 per cent. Certain valvular lesions of the heart, especially mitral and aortic stenosis will be attacked and the constricted opening enlarged sucessfully; occasionally a brilliant removal of a cardiac or pulmonary embolus will be done. Cancer of the esophagus will cease to present the almost hopeless problem which confronts us to-day. The abdomen is a field which appears to be pretty well tilled, although progress may be made in connection with a better understanding of the physiology of the spleen and adrenals, and possibly also of the pancreas and liver. In the vascular system, embolectomy and the restoring of impaired circulation will be developed. In the central nervous system, the astounding progress made in recent years promises further advances, among the most needed of which is the relief of hydrocephalus. The best surgical work on the brain and spinal cord is now necessarily concentrated in the hands of a few brilliant men, but a younger generation of neurological surgeons is being trained, and the coming years will show a vast increase in the benefit to suffering humanity in this field.

Future epochal advances in the domain which now belongs to the science of surgery appear to be likely inevitably to withdraw much from that domain and return it to the general control of the healing art, whence the science of surgery had taken it. For example, consider the problems of malignant disease, and of infection. Can anyone doubt that the problem of cancer will be solved? We know that there is an immunity to cancer; we have seen a rapidly growing carcinoma of the breast successfully removed, only to find at autopsy twenty-three years later that death was caused by a metastasis in the brain. This situation precludes an independent tumour arising *de novo*. Such a patient must have developed an immunity which almost overcame the disease. Moreover, it appears that there are a few dependable records of the spontaneous cure of cancer. Within the year, the agent of this immunity may be found, as simply and as logically as was insulin, and when found, this scourge of the race will be no longer in the province of the surgeon. In the meantime, until this blessed event, it is a reasonable hope that some form of radiant energy may control and destroy tumour growth and render operation unnecessary.

The same is true of surgical infection. The development of artificial immunity here is certain to progress and we may confidently expect the time when the diagnosis of an infectious process, whether it is osteomyelitis or empyema, or cellulitis, or appendicitis, or cholecystitis, will be followed at once by the administration of the appropriate serum or anti-toxin, so that surgery will be unnecessary except sometimes to repair damage when treatment was instituted too late.

When malignant disease and surgical infections are removed from the field of surgery, what will be left? The repair of injuries, the correction of congenital and acquired deformities, the relief of conditions incidental to the tissue changes of old age such as arterioscler-

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osis, prostatic hypertrophy, cataract—though even these may be susceptible to treatment by some as yet undeveloped type of physical energy, the restoration of organs displaced from their natural seat, and hernia. When the sphere of surgery shall thus have happily narrowed, much of the genius and time and patient research now devoted to its problems will be freed to be expended in other ways for the benefit of mankind.

VERTIGO AND ITS SIGNIFICANCE IN GENERAL MEDICINE*

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THERE is probably no one symptom with which the physician in general practice so often comes in contact, as that of vertigo, and also, there is probably no one symptom to which so little attention is paid as that of vertigo. During the past few years the writer has had referred to him for investigation some 250 medical and surgical cases in which dizziness was a predominating symptom. In many of these cases the dizziness was associated with nausea and vomiting; in others, with headache, equilibrial disturbances, muscular weakness, dyspnoea, and other symptoms.

We have been so accustomed in the past to look upon dizziness as something associated with minor gastric, cardiac, and intestinal disturbances, that the terms, gastric vertigo, cardiac vertigo, etc., appear to be still much in vogue, although, in the light of recent researches, we know that these terms are misnomers and that vertigo is a definite clinical entity due to disturbance of distinctive senses.

What is vertigo and how is it produced?—Vertigo, or dizziness, from whatever cause, may be defined as "a subjective sensation of a disturbed relationship to objects in space" (I. H. Jones). In its broadest sense one may consider it as "a sense of confusion resulting from any false perception of one's relative position to space or motion in space." (Mackenzie). All vertebrates, including man, tend to maintain a definite orientation with reference to the lines of gravitational force, or, in other words, to maintain their equilibrium.

Mach and Breur distinguish two kinds of equilibrial function:

(1) The "static," by which is produced a definite orientation with reference to the lines of gravitational force.

(2) The "dynamic," relating to movements of rotation. Any disturbances of these functions result in both *subjective* and *objective* manifestations. To the subjective we apply the term vertigo or dizziness. Numerous investigators in the realms of physiology, experimental biology, as well as otology and neurology, have determined accurately the normal compensatory movements and positions.

The maintenance of equilibrium depends on afferent impulses received by the cerebellum from three chief sources.—"The function of the cerebellum is to receive proprioceptive impulses from the body along with labyrinthine and visual impressions, and to integrate and develop from them impulses which, by being transmitted to the cerebral and other nerve centres that dominate muscular movements, so co-ordinate the nerve discharges from them that, when muscular movement occurs, it does so in relationship to the previous position of the animal and in the most efficient way to attain the object for which the movement was made. The cerebellum is the head nucleus of the proprioceptive system." (Macleod).

The so-called propriocepters situated in the muscles, tendons, and joints respond to differences in tension, contraction, or relaxation of the different body muscles, tendons, and ligaments. The centripetal impulses thus generated are transmitted to the cerebellum *via* the posterior

*Read before the Ontario Medical Association, May, 1923.

columns of Burdach and Goll as well as the lateral cerebellar tracts in the spinal cord. This sixth sense, the kinesthetic sense, serves to supply some information regarding the exact position of the body in space.

Associated with the kinesthetic sense in the maintenance of equilibrium we have the visual sense embodied in the visual organs, namely, the eyes, including their intrinsic and extrinsic muscles. Also, the third sense, and the most important one, the static-kinetic sense. The latter is supplied by the receptors situated within the membranous labyrinth of the internal ear. The three semi-circular canals are approximately in the horizontal, vertical, and sagittal planes, and the receptors are specialized for the purpose of responding to changes in the position of the head and therefore of the body in general.

The centripetal impulses generated by stimulation of the delicate hair cells of the maculae acousticae are transmitted by the vestibular fibres of the eighth nerve to Deiter's nucleus group and thence through the inferior cerebellar peduncle to the roof nuclei of the cerebellum on the same side. I. H. Jones has shown clinically and pathologically that different tracts may exist for both horizontal and vertical fibres, but it is not within the scope of this paper to discuss at any length the different views held regarding the exact distribution within the brain itself of the vestibular fibres and their intracranial connections.

It will be apparent that any abnormal stimulation of any one of these three senses, or any interference along the tracts by which the centripetal impulses travel, will result in that unpleasant sensation of confusion known as vertigo and in proportion a disturbance of equilibrium.

S. S. Maxwell, in his recently published monograph on equilibrium, has confirmed the findings of others, and has given us the objective signs or manifestations resulting from the experimental over-stimulation of each group of receptors and the destruction of certain portions of each of them. The loss of any one of these senses may cause temporary vertigo and disturbance of equilibrium, but, in many cases, within a comparatively short time the body may learn to accommodate itself by depending upon the other two senses.

According to Lewandowsky, the cerebellum is constantly sending out impulses producing tonic contraction of the muscles of the body, the so-called synergic impulses. The researches of Edinger, Bing, and Bárány go to show that the vermis of the cerebellum has the function of controlling the tonicity of the trunk, and that the lateral lobes are responsible for the tonicity and co-ordinate movements of the extremities. In the movement of an arm or leg, the conscious will proceeds from impulses from the cerebrum, but the guidance of the movement is through impulses from the lateral lobes of the cerebellum. Friesner states that the cerebrum originates movements and the cerebellum carries them out.

As far back as 1825, Flourens noted a definite relationship between the labyrinth of the ear and equilibrium. The classical experiments of Ewald, and the later ones of Purkinje, Bezold, and others, proved this relationship. Luciani, Majendie, and Loeb have thoroughly established the fact of the influence of the labyrinth of the ear on general muscular tonus. In 1861, Ménière described a syndrome with which his name is still associated, namely, vertigo, deafness, tinnitus and vomiting on attempting to move. In the one autopsy which he reported, there was found a sanguinous exudate filling the labyrinth of the ear; and for many years we have been accustomed to speak of almost any and every severe attack of vertigo, as "Ménière's disease." We may consider that the term "Ménière's disease" now occupies the same relationship to general medicine as eczema does to dermatology, that is, in most cases it is a name used to cloak our ignorance of the real pathological condition.

Time does not permit of our discussing Bárány's many experimental and clinical findings in cases of vertigo, associated with disturbances of equilibrium. Suffice it to say, that in 1915 he was awarded the Nobel Prize for his great contribution to this subject The systematized neuro-otologic diagnostic methods elaborated by him, constitute, perhaps, the most valuable aid we have in the accurate diagnosis of conditions associated with vertigo.

Let me briefly refresh your memory regarding Bárány's diagnostic methods—the so-called "Bárány tests." These tests consist in turning a patient in a revolving chair ten times to the right then repeating the turning ten times to the left. The syringing of each ear separately with water at a temperature of 68 degrees Fahrenheit, with the head placed at an angle of thirty degrees forward, and also syringing with the head placed at an angle of sixty degrees backward from the

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vertical. These tests cause a stimulation of the endolymph in the internal ear, and the centripetal impulses thus generated are carried along the vestibular fibres to the cerebellum and result in certain definite and constant phenomena in the normal individual. These phenomena are: dizziness, rhythmic nystagmus, and a definite past-pointing. The nystagmus varies in amplitude, duration, and kind, according to the stimulation received, and the position of the vertical canals of the labyrinth in relationship to the body trunk. It is not my intention to-day to discuss at any length the reason for these phenomena, but it is quite apparent that if these are constant in the normal individual, any lesion within the labyrinth itself or along the pathways of the vestibular fibres within the brain will prevent impulses thus generated from being received by the higher centres, and will cause either the complete absence of, or a distinct change in, these phenomena.

T. H. Wiesenburg, in discussing lesions of the central nervous system, emphasizes the fact that where there is the slightest suspicion of a lesion in the posterior cranial fossa, the investigation should include a complete neurological examination and the Bárány vestibular tests. Grainger Stewart advocates the closest co-operation between otologists, neurologists, and physicians, in all cases showing evidence of dizziness.

In the investigation of a patient who complains of attacks of vertigo associated with other symptoms, it is essential that our examination should be particularly directed to the investigation of the three senses which contribute to the maintenance of equilibrium, *i.e.*, the kinesthetic or muscle sense, the visual sense, and the static-kinetic sense.

(1) *Examination for Nystagmus.*—The presence or absence of spontaneous nystagmus, as well as its character and direction, should be noted. Many normal individuals exhibit a slight nystagmus. Such physiological nystagmus is present only when the eye muscles are put on tension, as in looking intently to the extreme right or left. It is of equal intensity to either side. Nystagmus, either rotary, horizontal, or combined, and of a rhythmic character, with a definite slow and quick component, is usually of vestibular origin and best seen when the patient does not fix an object. "Cerebellar nystagmus is essentially a fixation nystagmus, that is, it can be seen as a rule only when a patient fixes an object." (Gordon Holmes). Undulatory nystagmus—to and fro movements of the eye of equal intensity to either side when looking straight ahead—is usually of ocular origin, *e.g.*, so-called "miner's nystagmus." A vertical nystagmus is always pathological in origin.

(2) *Rhomberg test.*—It is essential to distinguish between a true and false Rhomberg, as many functional cases will exhibit the latter.

(3) *The pelvic girdle test,* or the attempt to overthrow. According to Bárány, a positive reaction indicates a lesion of the vermis of the cerebellum.

(4) *The rotation and caloric tests, and* Bárány *index test,* will inform us as to the condition of the vestibular fibres and their intra-cerebral connections and also the cerebellar centres.

(5) *The Babinski-Weil test,* which consists in walking forward and backward with the eyes closed is one which detects the slightest equilibrial disturbances and indicates most precisely the direction of the pathological impulses in the mild cases most often met with. (Bourgeois and Dundas-Grant).

(6) *The galvanic electric test,* or galvanic stimulation of the eighth nerve, helps to differentiate between a peripheral nerve and a central lesion.

(7) *Testing for adiadokokinesis, dysmetria,* and *asynergia:* this is indicated in all cases of vertigo.

(8) *Ophthalmological examination* for errors of refraction, muscle weakness, and fundus changes, is of importance to exclude ocular vertigo.

The writer wishes to stress particularly the fact that the above tests, to be of any value in the differential diagnosis of conditions causing vertigo, must be carried out in a most painstaking and thorough manner, and, if it is possible to have the patient under observation for a short period, they should be repeated at intervals of several days. Faulty technique in examination was responsible for the failure to detect lesions in several cases that have come under my observation.

In considering the cases which have been investigated by us it will be convenient for purposes of discussion to classify them under four heads:

(1) Lesions involving the visual sense.

(2) Lesions involving the vestibular or static-kinetic sense.

(3) Lesions involving the kinesthetic sense.

(4) Lesions of central origin.

Ocular vertigo.

Ocular vertigo is usually of a mild type and unaccompanied by disturbances of equilibrium or vomiting, although, in the severe types, the latter may occur. The patient usually describes it as swimming of the head, black specks before the eyes, a sense of constriction between the eyes, or frontal headache. It is more easily recognized by the physician owing to the fact that relief is immediately given by closure of the eyes. Errors of refraction, eye muscle weakness or paresis, incipient cataract, etc., are etiological factors. One frequently observes it in cases of arteriosclerosis in which there is probably some involvement of the eye muscle nuclei or visual centres. Movements of the eyes tending to place the muscles on tension, such as, star gazing or looking to the extreme right or left, is frequently given by the patient as the exciting cause. Train sickness may be considered as a severe form of ocular vertigo due to the attempt to fix the eyes on quickly passing objects.

Vestibular or rotational vertigo.

Cases of severe vertigo are more often of this type and are described by the patient as a sensation of external objects moving rapidly, and usually in a horizontal plane. If the eyes are closed he feels as if he himself were being turned rapidly. During an attack inability to maintain equilibrium is manifested. Several patients have described their attacks as resembling acute alcoholic intoxication. Attacks may be of a few seconds duration or last several days. If prolonged, severe nausea and vomiting associated with headache, marked pallor, diaphoresis, and extreme weakness are present. Quick movements of the head, or the attempt to sit up in bed tend to increase the vertigo, and, in proportion, the nausea and vomiting. Nystagmus is usually present *during* the attack and is of the rhythmic type. Alexander and other authorities claim that nystagmus is always present, but the writer has observed two cases of very severe vertigo in which nystagmus was absent. Etiological factors are:

(a) *Lesions involving the non-acoustic labyrinth*, namely, congestion, irritative or destructive, serous or suppurative, toxaemia, and new growths.

(b) *Lesions of the eighth nerve*, namely, neuritis, specific or non-specific, meningitis, tumours, etc.

(c) *Intracranial lesions involving the vestibular tracts to the cerebellum or the cerebellum itself*, namely, new growths, infarct, thrombosis, abscess, gumma, tubercle, etc.

In peripheral lesions, the nystagmus is definitely rotary in character, and in acute destructive lesions it progressively diminishes in intensity until it finally disappears within a fortnight or three weeks. Nystagmus of central origin is usually less definite in character and may be either horizontal or vertical. If the central lesion is progressively destructive the nystagmus persists and increases in intensity.

Spontaneous or provoked deviations (Bárány *Index test*).—It is important to distinguish between interference with the cerebellar centres due to a local destructive process in the cerebellum itself or local pressure, and that due to a general increase of intracranial pressure. A spontaneous pointing error disappearing after relief of increased intracranial pressure by surgical or other means, indicates that the interference with the function of the cerebellar centres was due to generalized pressure and *not* to a lesion in the immediate vicinity of the centres. Sea-sickness has been shown by Bárány to be due to the continuous abnormal stimulation of the vestibular apparatus.

The following cases are illustrative of the rotational type of vertigo:

Case 1.—J. M., male, aet. 40. Complaint: Attacks of dizziness, headache, severe nausea, vomiting, and general weakness. Duration, three years. Has been picked up on three occasions in the street in a semi-conscious condition. *General Physical examination* (3.9.22) negative. *Neuro-otological examination*—Marked hyper-irritability of vestibular apparatus right side, impaired hearing. Large cholesteatomatous mass filling right middle ear. *Diagnosis:* Irritative peripheral lesion. *Treatment:* Radical mastoidectomy, removal of cholesteatoma, primary skin graft. *Result:* No further attacks up-to-date (1.5.23) and an increase in weight of twenty-two pounds.

Case 2.—T. M., male, aet. 38. Complaint: Attacks of severe giddiness associated with right parietal and frontal headache, backache, and general malaise. Duration, five years. States has been under treatment for nephritis since 1917. *General physical examination*—negative. *Neurological report* (29.8.22). No evidence of disease of central nervous system. (Fletcher). *Kidney function test*—normal. *Urinalysis:* Sp. gr.

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1020, slight amount of albumen, no casts. S.B.P. 135; D.B.P. 90. *Neuro-otological examination:* Vestibular fibres right side markedly hyper-irritable. Some necrosis of ossicles of right middle ear and fistula leading into right horizontal semi-circular canal. *Diagnosis:* Irritative peripheral lesion. *Treatment:* Radical mastoidectomy, closure of fistula. *Result:* No further attacks up-to-date (1.5.23). Urinalysis normal on five different occasions.

Both these cases had peripheral lesions causing irritation of the labyrinthine receptors. In the second case, the previous diagnosis of nephritis was definitely shown to be an incorrect one, and the albumen which was found immediately following attacks was apparently due to the focus of infection within the ear. The correct diagnosis was possible only by employing Bárány's diagnostic methods.

Case 3.—G. C. S., male, aet. 27—Admitted to hospital, 1.1.23, as an emergency case with the diagnosis of "acute abdomen." *Complaint:* Severe headache, dizziness, vomiting, and abdominal pain. Duration, six hours. States had previous similar attack in England, 1917, at which time an appendectomy was performed. In 1919, had an abdominal operation for adhesions. Has had slight attacks associated with a dull pain behind right eye off and on for the past two years. *Surgical report* (1.1.23): No evidence of abdominal condition requiring surgical interference. (N. Shenstone). Gastro-intestinal X-ray series negative for gastric and duodenal ulcer. Kidney function test normal. *Neurological report:* examination reveals no definite evidence of a gross lesion. (G. F. Boyer). Spinal fluid normal. Wassermann blood and spinal fluid negative. *Neuro-otological examination,* (9.1.23): Total nerve deafness right. Rhomberg positive slight to left. Babinski-Weil test positive to right. Slight rotary spontaneous nystagmus on looking to right and to left. Right vestibular fibres definitely hypo-irritable. (R. S. Pentecost). *Re-examination,* (22.1.23): dizziness less marked. No vomiting for past week. Hearing right ear, two feet, left, twenty feet. Right vestibular fibres completely inactive, left normal. (R. S. Pentecost). *Re-examination,* (15.2.23): hearing right, eighteen feet, left, twenty feet. Right vestibular fibres now active but sluggish. (R. S. Pentecost). *Conclusions: Diagnosis*—an irritative lesion of the cerebral connections of the right vestibular fibres, of non-specific origin, but not sufficient to produce gross clinical findings indicative of cerebral pressure. (G. F. Boyer and R. S. Pentecost). In view of the history of an attack of a similar nature in 1917, the diagnosis of appendicitis made at that time is open to question.

Vertigo associated with trauma.—In perforating wounds of the head with or without trauma of the temporal region, attacks of vertigo of the vestibular type are almost a constant symptom. In cerebellar wounds, André Thomas has observed a syndrome of cerebellar type—vertigo and disturbance of equilibrium both at rest and when walking, associated with asynergia, adiadokokinesis and other manifestations. Cranioplasty, with repair of the cranial defect by grafts of bone, cartilage or fascia gives relief from dizziness in a large proportion of cases.

Kinesthetic vertigo.

Vertigo of this type is of a very indefinite character, and is more often described by the patient as a sense of confusion, associated with difficulty in estimating his exact relationship to surrounding objects. It is particularly noticeable in the dark or with the eyes closed. It is one of the earliest symptoms in diseases attacking the posterior columns of Burdach and Goll, or the lateral cerebellar tracts in the spinal cord. Owing to the slow and gradually progressive nature of most of these chronic conditions the vertigo is usually of a mild type and less marked than the equilibrial disturbances. "In certain cases of tabes dorsalis the proprioceptive sensations are lost and the patient, therefore, has vertigo and marked disturbances of gait, unless the movements are guided or controlled by vision." (Gordon Holmes). Acute polyneuritis involving sensory nerves will also produce vertigo of this type, according to Mackenzie. The presence of normal compensatory movements on stimulation of the vestibular apparatus, and the absence of signs pointing to an ocular or central lesion, together with a complete neurological examination, will serve to establish the diagnosis.

Vertigo, associated with hypertension as in nephritis, and hypotension as in Addison's disease or Graves' disease, is also frequently met with by the physician.

Vertigo associated with cardio-vascular disease.

In the cases examined by the writer in which general physical examination showed evidence of

definite cardio-vascular disease, the vertigo was of the following type, *viz.*, swimming sensation of the head, specks before the eyes or blackness, with more or less dyspnoea on exertion, but unaccompanied by nausea, vomiting, or equilibrial disturbance and unaffected by quick movements of the head. One may divide the cases into two groups:

(*a*) Those in which vertigo occurred with change in position of body (from stooping to standing position, or getting out of bed quickly).

(*b*) Vertigo occurring particularly on the *cessation of sustained effort* (the attempt to lift heavy weights, running to catch a car, etc.).

According to L. M. Murray, fainting is quite another phenomenon and depends on a vaso-vagal disturbance. The examination for effort reaction is of importance in these cases.

Cerebro-spinal syphilis.—"In many cases of meningo-vascular neuro-syphilis, vertigo of a transient character associated with loss of memory is the first definite symptom of the disease." (Tilnay). The value of a neuro-otological examination in cases of syphilis involving the nervous system is illustrated by the following case:

Case 4.—M. D., female, aet. 28—Has been fairly healthy except for some eye and throat trouble as a child. Married four years. No miscarriages. One healthy child age three. *Complaint:* Attacks of dizziness, occasionally associated with nausea and vomiting, increasing deafness. Duration six months. During the past two months attacks have become more frequent and patient becomes very tired on the least effort and is forced to rest for several hours during the day. *General physical examination,* (25.9.22), negative. Some scarring of the pharynx. *Neuro-otological examination,* (26.9.22): Nerve deafness almost complete right and of a slight degree left. Right vestibular fibres almost completely inactive with loss of compensatory movements on stimulation. Left decidedly hypoirritable. *Diagnosis:* Involvement of both acoustic and vestibular fibres on both sides—lesion situated in brain stem and probably syphilitic. Wassermann test of the blood made September 9th, 1922, was triple plus, confirming the diagnosis of syphilis. Anti-syphilitic treatment was at once instituted, and, on examination on April 20th, 1923, patient stated that she felt very much improved in general health and her attacks of dizziness were less severe. There was slight improvement in hearing of the left ear but no change otherwise in physical findings. Information received at a later date in a letter from the family physician who treated patient as a child, would indicate that this patient's syphilis was congenital in origin and had remained dormant for many years.

Central vertigo.

Under this heading we may include the type of dizziness due to disturbances within the brain itself. This is less defined and distinct than the others previously mentioned and may be due to a variety of causes:

(1) *Cerebral congestion or cerebral anaemia.*—Cerebral congestion may be present in many cases of acute infectious disease, and cerebral anaemia is particularly noticed in cases of arterio-sclerosis, enarteritis, pernicious anaemia, and other conditions affecting the cardio-vascular system.

(2) *Toxaemia,* either acute or chronic.—Among the *acute* toxaemias one might mention alcohol, tobacco, and the toxins generated during acute infections. *Chronic* may include, auto-intoxication of intestinal origin, and particularly focal infections in the tonsils, teeth, and other areas. Cases of vertigo due to evanescent toxaemia probably constitute a large proportion of the cases of mild vertigo seen by the physician.

(3) *Focal lesions in the brain* of vascular origin as described by Pierre Marie, including perivascular and paravascular sclerosis, miliary haemorrhages, and complete or incomplete areas of miliary softening, are a frequent etiological factor. In 69 cases of multiple sclerosis recently reported by Fischer, vertigo was present in 51%. The writer has examined several cases of disseminated sclerosis in which vertigo was present, and in all there were objective signs of definite interference with the tracts of the vestibular fibres.

(4) *Brain Tumour.*—"Dizziness is rarely absent in growths below the tentorium, and is one of the earliest symptoms of brain tumour in any area. The curious tilted attitude of the head seen in some cerebellar cases, is probably of vestibular rather than cerebellar origin." (Foster Kennedy). In a series of ten cases of tumours of the cerebello-pontine angle reported by Vail, from the Cushing Clinic, the examination by means of the Bárány diagnostic tests showed constant and definite findings in every case. I. H. Jones, Bárány, and others have reported many cases of tumours of the posterior fossa accurately localized by these tests. The following case ex-

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amined by the writer is of interest from this standpoint:

Case 5.—W. P., male, aet. 34. Complaint: Dizziness noticed when he turns quickly or exerts himself and described by him as similar to seasickness; headaches, sometimes frontal but lately occipital; general weakness. Duration, six months. *General physical examination,* 17.11.22. Some mitral insufficiency without hypertrophy of the heart. (L. M. Murray). *Neuro-otological examination,* (29.12.22). Findings—a definite spontaneous outward deviation right arm three inches but not constant. On walking with eyes closed, patient deviates definitely to the right. Rhomberg—indefinite. Vestibular apparatus appears otherwise normal. (R. S. Pentecost). *Eye report,* (21.2.23). Right and left vision 6/9ths. Field of vision full. Fundi normal except arteries are small and do not give one the impression of being healthy. (W. Wright). *Neurological report,* (22.2.23). Some symmetrical atrophy, no tremor, reflexes normal, Rhomberg present but of hysterical type—patient always falls to the nearest support. Positive Von Graefe. Impression—tentative diagnosis—psychic neurosis. Recommend further close neurological observation. On February 23rd, 1923, the patient became quite ill and was admitted to another hospital and kept under observation until death occurred March 12th, 1923. During this period, neurological reports indicate the development of a definite optic neuritis on both sides, spontaneous nystagmus to both sides probably more marked to right, tongue pushed to left side, suggestive ankle clonus and Babinski left, confused mental condition. The diagnosis of right frontal tumour is recorded. The patient died before operation could be performed. *Pathological report:* "Cyst $1\frac{1}{2}'' \times \frac{1}{2}''$ located in the right side of cerebellum and evidently arising from the white matter, diffuse haemorrhage."

The writer did not have the opportunity of examining this patient after the onset of his acute symptoms and there is no record of any re-examination of his vestibular apparatus while in hospital. It is worthy of note that dizziness was the first symptom complained of, and the first abnormal objective finding was an interference with the inward pointing centre of the right side of the cerebellum. It is regretted that subsequent neuro-otological examinations were not made, as in all probability it would have made possible a more accurate diagnosis of the site of the lesion.

Case 6.—F. W. P., male, aet. 38. Complaints: Attacks of vertigo of indefinite character followed by temporary unconsciousness and the desire to sleep. Duration, four years. Patient has been under observation in a mental hospital for the past two years and was discharged one month ago with the diagnosis of hystero-epilepsy. Admitted to hospital, May 12th, 1923. *Neuro-otological examination,* (17.5.23). Complete absence of all reactions to the rotation, caloric, and electric tests, on both sides. Slight impairment of hearing left side, due to middle ear involvement. Hearing right, normal. *Diagnosis:* Central lesion in the vicinity of the crura. In considering the above case it is of interest to note that previous general physical and neurological examinations revealed no evidence of disease. The diagnosis of hystero-epilepsy would, therefore, appear to have been justified. The patient is at the present time being kept under observation in the neurological wards.

Case 7.—The following case is illustrative of vertigo due to evanescent toxic irritation from a focal infection: *W. K., female, aet. 33.—Complaint:* Attacks of dizziness of indefinite character associated with loss of appetite, general malaise, and disinclination to do any work entailing physical or mental effort. Duration, three years. Previous history negative, except for an attack of pneumonia at age of eighteen. Present history—states attacks are of mild type usually lasting two or three days and associated with headache and slight sore throat. *General physical examination,* (6.2.21), negative. *Nose and throat, and neuro-otological examination,* (10.2.21). Vestibular apparatus normal, but hyper-irritable. Tonsils show definite evidence of focal infection. Advise tonsillectomy. *Treatment:* Tonsillectomy for removal of focal infection. *Result:* No further attacks of vertigo, etc., up-to-date, (March, 1923).

Psychic vertigo.—Dizziness of psychic origin can hardly be considered as true vertigo. The normal individual is able to walk without difficulty along a narrow plank placed on the ground. If requested to walk along the same plank placed at a great height he would, in all probability, be seized with severe dizziness. This type of vertigo may be considered of pyschic origin and to have no relationship to vertigo of pathological origin. M. Coué, the apostle of auto-suggestion, would have us believe that all vertigo is of this type.

In considering cases of vertigo in general, the question of its relationship to abnormal blood

pressure is of interest. It would appear that many physicians incline to the view that nearly all cases of vertigo are associated with an abnormal blood pressure. In the series of cases examined by the writer, only four showed any appreciable abnormality in blood pressure.

Summary:

(1) Vertigo is the result of interference with the function of either the vestibular, ocular, or kinesthetic senses. It varies in character from a slight sensation of swimming of the head to a sensation of a definite rotation of the body and of external objects. In some cases, the resulting nausea or vomiting, or equilibrial disturbances, may be the chief complaint of the patient.

(2) The etiological factors are numerous, and, in the differential diagnosis, it is essential that one should obtain a detailed statement from the patient as to the character of the vertigo, whether influenced by change in position of the body, quick movements of the head, or closure of the eyes.

(3) The examination of the patient should include a general physical examination, and, in cases of severe or persistent vertigo, a complete examination of the ear and vestibular apparatus according to the systematized diagnostic methods of Bárány and Jones.

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THE EFFECTS OF ETHER ANAESTHESIA ON AFFERENT PATHS IN DECEREBRATE ANIMALS

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CRILE and Lower[1] have contended that "ether anaesthesia offers no protection to the brain cells against the effect of trauma, and that the lipoid solvent anaesthetics probably break the arc which maintains consciousness beyond the brain cells somewhere in the efferent path." They state that "the afferent path from the seat of injury being unbroken, the afferent stimuli reach and modify the brain cells as readily as if no anaesthetic had been given." These conclusions were based on histological examination of nerve cells, a method which is beset with difficulties in the way of arriving at positive conclusions, because of the great variation between individual cells under similar treatment.

Dr. W. B. Cannon suggested that we might obtain evidence bearing on this question by galvanometric recording of the action currents in afferent nerve paths in the decerebrate animal. This is the most direct method of attacking the problem. The action current is the most reliable proof of the passage of a nerve impulse; and the disappearance of action currents in the afferent tracts in the brain stem under anaesthesia would be dependable evidence of the cessation of sensory impulses.

A full account of our experiments with ether anaesthesia by this method has already appeared[2]. In the present paper we propose to give a somewhat condensed account of this work, and to add a brief statement of the results already obtained by the same method with intravenous injection of $MgCl_2$ (magnesium chloride).

The decerebrate cat is an ideal preparation with which to experiment on this problem. The brain stem being transected under deep anaesthesia, at the anterior edge of the anterior colliculi, the animal goes into a state of decerebrate rigidity, in which he lies still with limbs extended, the centres of consciousness gone, but the respiratory centre still functioning and maintaining life. Operative procedures and stimulation of sensory nerves may then be employed, with or without ether, without causing pain.

All sensory nerves from the limbs lead to the

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brain by a path consisting of a peripheral neurone which in every case connects with the central neurone at some point in the spinal cord or the medulla oblongata. These central neurones continue forward to a point beyond the plane of transection in the decerebrate preparation. They approach the cut surface of the brain stem in the medial fillet. With the cerebrum removed and the severed brain stem freely exposed, electrodes may be applied in such a way as to lead off action currents marking the progress of sensory nerve impulses in these neurones. Our problem, therefore, was to apply stimulating electrodes to a large peripheral nerve and record with a string galvanometer the disturbance set up in the neurones of the fillet, while the animal was free from ether anaesthesia; then to determine whether the response so obtained was modified by such ether anaesthesia as is used in surgery, and if so, the nature of the modification. In a preliminary research[3] it was shown that even when ether anaesthesia is pushed to the point of stopping respiration, peripheral nerve trunks will conduct impulses in response to stimulation and these will be marked as usual by action currents. When a nerve is exposed directly to ether vapour, the action current, or electric response, persists as long as the nerve is able to conduct impulses, judging from the response of the innervated muscle. The action current is probably an inseparable feature of the nerve impulse, and may be regarded as a sure criterion of function for the purposes of our problem.

Experimental Procedure. The animal is deeply etherized and then decerebrated by the Sherrington guillotine as already described in detail (reference 2, p. 115). The sciatic nerve was severed in the thigh and shielded, stimulating electrodes applied to the central end. Afferent impulses were evoked by single break shocks from a large inductorium. Non-polarizable leading-off electrodes were connected with the string galvanometer. We found that the best responses were obtained with one lead applied to the ventral edge of the cut surface of the brain stem a few millimeters from the median plane on the opposite side from the stimulated nerve, and the other lead applied to the posterior colliculus diagonally opposite, that is, on the same side as the stimulated nerve. After the animal had come well out of the ether under which he was decerebrated, the electric responses evoked by a series of single stimuli applied to the sciatic nerve were recorded. Ether was then given by means of a bottle connected with the tracheal cannula, and the responses to similar stimuli were recorded from time to time as the anaesthesia deepened. At the same time the presence or absence of reflexes (flexion reflex, corneal reflex, and pinna reflex) was noted. When deep surgical anaesthesia had been induced, usually about the time respiration began to show signs of impairment, ether was withdrawn, and a similar series of records was taken as the animal came out of anaesthesia.

Results. The typical response obtained by this method of recording consists in a small initial excursion of the string in the direction which signifies negative potential in the ventral electrode, occurring about 0.008 or 0.009 second after the stimulus, followed by a larger excursion in the same direction, which usually reaches its height about 0.026 second after the stimulus. By exposing the medulla oblongata and applying one electrode to its dorsal surface and the other electrode to the posterior colliculus and taking records on a high-speed film, using electron-tube amplification to magnify the excursions, we showed that the small initial excursion in the brain-stem records corresponded in time with the maximum excursion when the electric response was derived from the medulla. From this fact we concluded that the initial excursion represents the arrival of the impulses in the medulla, and probably depends on the extensive branching of the central end of the peripheral neurones just before they make connection with the central neurones there. The second excursion, which in the brain-stem records is the largest, is probably due to the impulses in the central neurones passing up into the fillet.

The effect of ether inhalation was to reduce or even abolish the second excursion (in the brain-stem records, the major excursion) while the initial excursion was scarcely affected at all. The amount of reduction of the second or major excursion varied somewhat with different preparations. In general an appreciable decrease began before either the corneal or the flexion reflex disappeared, these being the first

reflexes to go. The pinna reflex usually lasted almost as long as respiration, and before this disappeared the galvanometric excursions were reduced to a small fraction of their normal value, or abolished altogether. This usually occurred in about five or six minutes. The maximum effect of the ether seemed to come about a minute after it was withdrawn. Then the excursions of the galvanometer became gradually larger and usually attained their original magnitude soon after the reappearance of the corneal and flexion reflexes.

Since peripheral nerve fibres are not appreciably affected by ether in such concentration as reaches them during general anaesthesia, it is reasonable to expect that the morphologically similar continuations of these fibres in the spinal cord will not be affected much either. Sherrington[4] advocated the view that ether acts on the synapses, or points of connection between neurones. On this view we should expect the impulses to continue under ether to traverse the peripheral neurones to the synapses, and there to encounter a block. In the central neurones passing up the fillet we should expect to find a reduction of activity. This is precisely what our experiments seem to show. The second excursion, which seems to be identified with the activity of the central neurones, is what becomes reduced almost to the point of vanishing under deep surgical anaesthesia.

Since Adrian[5] has established the "all-or-nothing" character of the nerve impulse, and in particular the fact that an impulse which is not quite extinguished in a region of impaired conductivity, regains its full size on emerging into a normal region in the nerve[6], we must conclude that the diminution of the galvanometer excursions does not mean a reduction in the size of individual nerve impulses, but rather a reduction in their number. At some of the synapses in the medulla and cord the impulses are probably completely blocked, while at others where the block is incomplete, the impulses pass through and regain their full size in the central neurones. From the great reduction in size of the galvanometric excursions we may conclude that under deep surgical anaesthesia very few of the central neurones still receive impulses on peripheral stimulation. It seems to follow that ether is effective in protecting the brain from such damage as it may suffer from sensory impulses.

The work of Meltzer[7] in which he demonstrated the power of $MgCl_2$ to produce general anaesthesia and the effect of $CaCl_2$ in neutralizing the action of $MgCl_2$, suggested that by means of these salts anaesthesia might be quickly induced and withdrawn, and might be conveniently controlled by means of the balance between magnesium and calcium. We have made a few experiments by our method of leading off action currents from the brain stem on decerebrate cats before and after intravenous injection of $MgCl_2$ and subseqent injection of $CaCl_2$.

In these experiments we have employed, besides the usual electrical stimulus, acoustic stimuli (*e.g.* the sound of a watchman's rattle) to produce sensory impulses. These regularly evoke action currents in the brain stem, and they obviate the electrical artefact coming from the induction shocks, which, in the case of electron tube amplification are sometimes confusing.

Although these experiments have not yet been extensive enough to warrant final judgment, they already suggest that $MgCl_2$ is a dangerous and unsatisfactory anaesthetic. In the first place a small increase in the dose beyond that which suffices to abolish reflexes, (about 0.15 gm. per kilo of body weight) is apt to cause a rather sudden paralysis of the respiration. In the second place our records seem to indicate that the reduction of afferent impulses is not quite as great in proportion to the abolition of reflexes as it is in the case of ether. This suggests that the action is relatively more on the motor side of the total chain of neurones and less on the sensory side, than in ether anaesthesia; but on this point we are not yet prepared to make a positive assertion. The only thing to be said for the magnesium anaesthesia is that $CaCl_2$, if injected before respiratory failure is complete, will completely restore the animal in a few seconds.

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ANAESTHESIA AND ANALGESIA IN LABOUR*

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"IN sorrow thou shalt bring forth children." The primal curse pronounced upon woman has never been revoked. Throughout all the ages childbirth and pain have been associated in men's minds. "Fear took hold upon them as of a woman in travail," says the Psalmist, and the solemn prayer of the *Litany* singles out the sorrows of the woman in labour.

From the dawn of antiquity men have sought to alleviate these sufferings but little was accomplished until the gift of anaesthesia was bestowed on a pain-filled world. It will ever remain one of the glories of the art of obstetrics that this priceless gift to humanity was so soon after its introduction employed to relieve the pangs of motherhood and that in the quest of something better than ether it was an obstetrician who found a new anaesthetic. On October 10th, 1846, in Boston, Morton demonstrated the anaesthetic properties of ether. Three months later in Edinburgh, Simpson used it to perform a version and an extraction. In November 1847 he discovered the pain relieving powers of chloroform which agent had been suggested to him for trial by Waldie, a Liverpool chemist, and thereafter used it in his practice in place of ether. There was much opposition both from medical and lay sources but the advantages were so great and manifest that the critics were stilled. It is said that when Simpson proposed the use of chloroform in Queen Victoria's confinement in 1853, the bishops voiced their dissent inasmuch as the Scriptures had decreed pain as the necessary accompaniment of childbirth. The Queen replied that none of the bishops had ever had a baby, but that she had passed through that experience and her experience should decide.

For three generations the rival claims of ether and chloroform engaged men's minds but within recent years two other agents have contested their supremacy. In 1880 Klikowitch, of St. Petersburg, proposed the use of nitrous oxide and oxygen in obstetric cases, but it was not until after 1913 that their use became general owing largely to the work of Guedel, Lynch, Hoag, and C. H. Davis. In 1902 V. Steinbuckel recommended the use of morphine and scopolamine in lobour and the method was popularized by Kronig and Gauss, of Freiburg, about 1913. Lately the use of these two drugs has attracted much attention particularly in the British Isles.

It would be foolish to deny that all opposition to the use of anaesthetics and analagesics has disappeared or that their introduction has been an unmixed good. The following disadvantages are still urged:

1.—The risks of anaesthetics, particularly chloroform, to the mother.

2.—The risks of anaesthetics and analgesics, particularly morphine, to the child.

3.—The increased necessity of interference.

These disadvantages are practically annulled if care and judgment are used. They are far outweighed by the advantages. These are threefold in character, humanitarian, obstetrical, and physiological. To many women the approach of childbirth seems like the entrance to the valley of the shadow of death and it is of untold value to them to be assured that their sufferings can be mercifully lightened. The obstetric advantages lie in the ability of the accoucheur to make a clearer diagnosis, to have a more manageable patient, and to be able to preserve a better surgical technique. The physiological advantages have been taught us by recent physiologists, particularly Crile, who has demonstrated the actual nerve changes produced by fear, suffering, and shock.

The point in the course of labour at which anaesthesia or analgesia should be induced has been much discussed. That point can never be determined in general but it should be determined in each particular case. Labours differ much in length and severity and the mental reactions of women to the approaching trial are as far asunder as the poles. The aim should be by prenatal

*Read before the Winnipeg Medical Society, September 15, 1922.

care to bring the women to the approach of labour in as fit condition as possible and during labour to have the physiological forces utilized to the best advantage. Prenatal care insures to the patient a feeling of confidence in her medical attendant, and to the doctor, confidence also, since he is in the position of a general who has surveyed his battle ground and has pre-determined his strategy. In the first stage, if the patient has confidence in her doctor, if the nurse is competent, and if the lower bowel and bladder are thoroughly emptied, much of the nagging and disheartening character of the pains will disappear.

In the second stage the voluntary powers should be utilized as far as possible and in many cases it is possible to withhold the anaesthetic until the head reaches the pelvic floor. At this time there is a decided advantage in the use of an anaesthetic.

In the third stage if lacerations have to be repaired or an adherent placenta removed, an anaesthetic should be given.

With all these generalizations there remains much scope for the exercise of judgment in the individual case. In the first stage, one woman will need only a few words of encouragement and the assurance that all is going well, another will be both physically and mentally benefitted by a dose of morphine and scopolamine. In the second stage analgesia may be sufficient in one case while in another surgical anaesthesia will be demanded.

The value of anaesthetic drugs being admitted, the choice of the particular agent must be considered. In this section of the continent chloroform is pre-eminently the anaesthetic of labour. Its merits are obvious. It is convenient in use, agreeable to the patient, and in the vast majority of cases, well tolerated. There is no doubt that the parturient woman enjoys an immunity from the risks of the drug. At the same time this immunity is only relative. Chloroform has been known to produce changes in the liver analogous to those produced in eclampsia and its use is, therefore, contra-indicated in toxaemic states. Further, as it is a depressant it should not be used where any prolonged operation, or one involving shock, is to be undertaken. Munro Kerr insists that chloroform favours post partum haemorrhage, very decidedly so, if the administration has been continued for any length of time and surgical anaesthesia has been induced.

Ether is less convenient, and less agreeable, it is irritating to the bronchi and kidneys and is more difficult to employ as an analgesic. On the other hand it is superior to chloroform where surgical anaesthesia has to be maintained for more than a few minutes. It may be advantageously combined with oxygen in many cases.

The value of morphine or some opium derivative, combined with scopolamine, hyoscine or atropine is generally admitted, during the first stage in certain cases. Their value in the second stage has been the subject of much controversy. Without going fully into this vexed question, I may say that their use calls for constant watchfulness on the part of either the doctor or of a nurse with special training in their use and generally presupposes that the patient is in a hospital. These restrictions tend to limit their field of admitted usefulness.

The nitrous oxide oxygen method has its enthusiastic advocates. These claim that the physiological forces are better utilized, that analgesia is a matter of only seconds, that the cooperation of the patient can be better secured and hence labour is actually shortened, and that shock is lessened on account of the rapid elimination of the drug and the more transient tissue changes. Others, however, state that the use of nitrous oxide is only comparatively safe, that it raises blood pressure and hence that it is contra-indicated in cases of high blood pressure, toxaemia, and cardiac disease. They point out that the apparatus is cumbersome and the cost of the gas high. While there is so much force in these objections that nitrous oxide and oxygen are never likely to be used in all cases, yet the method is of real value. I have used a Clark portable apparatus in a number of cases and have found it to work most satisfactorily. In the average case the cost of the gas does not exceed two or three dollars. My aim in these cases when the gas was used was to secure analgesia not anaesthesia so that the patient was relieved of pain, but remained conscious and was able to cooperate. In practically all this aim was reached. A striking feature was the regularity of the pains and the way in which patients responded to suggestion. In some cases surgical anaesthesia with ether or chloroform at the close of the second stage was used. In several cases, however, complete and satisfactory anaesthesia which allowed forceps operations to be done was obtained. In some cases the baby was delivered by the natural forces where it seemed that with

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other anaesthetics intervention would have been necessary. The condition of mothers and babies after the use of nitrous oxide and oxygen was all that could be desired.

Special anaesthesia has been employed in cases of labour complicated with terminal valvular disease, advanced tuberculosis, bronchitis, and pneumonia with satisfactory results, but it is never likely to come into general use.

Conclusions

1.—The use of substances to relieve pain has been of untold benefit alike to doctor and patient.

2.—Each individual case must be studied not only during, but also before, labour.

3.—Each of the drugs mentioned has its special advantages and disadvantages and no one drug should be used in obstetric practice to the exclusion of all others.

PRESIDENTIAL ADDRESS
PRINCE EDWARD ISLAND MEDICAL SOCIETY ANNUAL MEETING.

J. A. MacPhee, B.A., M.D.

Summerside

I MUST first express my deep appreciation of the honour of presiding at this, the thirty-fifth annual meeting of the Prince Edward Island Medical Society, at the same time admitting that there are many more worthy of this honour and more capable than I am of fulfilling the duties of this position.

The annual meeting of the Provincial Medical Society is an event to which every practicing physician in the province should look forward and at which he should be present if possible. The meeting may be taken as a criterion of the medical men of the province, for a meeting well attented, in which the members evince their interest by the attention paid to the various items of the programme and by participating in the discussions, will reflect credit and show that they are wide awake and striving to keep abreast of the times. The getting together at meetings of this kind, the renewing of acquaintances, the comparing of notes with one another and listening to the papers and discussions cannot fail of making a man's outlook broader and adding to the sum of his knowledge. Our annual meetings should be more largely attended; only a day is taken up and now thanks to the motor car one can come from any part of the province and return the same day. By increased membership and better attendance at the meetings, our Society shall grow and flourish and be doubly useful to its members.

Modern medicine is becoming more and more associated with preventive medicine so that at the present time the prevention of disease rather than its treatment looms larger and larger in the medical mind. The trend of medical practice at the present day is, following the old adage "An ounce of prevention is worth a pound of cure."

It may seem anomalous that the medical profession, which is so much concerned with the treatment of the sick from whom it draws its emolument, should be waging an unceasing warfare against disease, bending every effort towards its prevention and eradication; but it is nevertheless true, and this shows the altruism of the profession—that its aims are not selfish but, on the contrary, are directed towards the common good. In the last fifty years preventive medicine has, with the discovery of the causes of the serious epidemic diseases steadily advanced to a position of great importance, so that from a blundering art it has become a science.

In connection with the development of preventive medicine, the names of Pasteur, Jenner, Koch, and Lister will always illumine the pages of medical history for their great contributions to the science of medicine towards the preven-

tion of disease, the amelioration of human suffering, and the saving of human life. The late Sir William Osler, towards the close of his illustrious career especially, was a great exponent of preventive medicine. He held that the future of medical practice lay in the preservation of health, in the prevention of disease, and said in one of his addresses, "No longer is our highest aim to cure but to prevent disease."

Marvellous things have been done by sanitary science in recent years towards the prevention of diseases which formerly exacted a fearful toll from the areas which they ravaged. The conquest of yellow fever and malaria in the tropics making them fit for the white man to live in is one of the most brilliant achievements of preventive medicine. At Havana, yellow fever was stamped out by an anti-mosquito compaign in a single year, and in Panama, General Gorgas eliminated yellow fever completely and reduced the incidence of malaria from 81.9 per 100 employees in 1906 to 1.5 per 100 employees in 1916, thus making possible the construction of the Panama Canal with a very small loss of life by disease and in this way much shortening the construction period. The sanitary measures which brought about the changed conditions in these areas were measures aimed at the destruction of the mosquito and its breeding places, and the draining of the infected areas.

The general reduction in the incidence of typhoid fever in this country as a whole and its lessened death-rate is another brilliant achievement of preventive medicine. This has been effected by various sanitary measures:—the purification of water supplies, the care of excreta, the supervision of the milk supply and pasteurization of milk, the sanitation of food supplies, the control of typhoid patients and carriers, and preventive inoculation.

Typhoid fever in former wars was the scourge of armies in the field. In the British Army during the World War there was almost an entire absence of typhoid on account of protective inoculation of the troops against this disease. This method of prophylaxis should be made use of more in civilian practice for the protection of nurses and attendants in typhoid cases, the other members of the household from which the patient comes, and all who are in any way exposed to contagion.

One would expect with our present day knowledge of typhoid and the means at our disposal for its prevention, that serious epidemics of this disease were a thing of the past, but it is only by eternal vigilance that the disease can be kept in the background to which it has been relegated on this continent. The water supply which is the chief medium through which the infection gains entrance into a community must be jealously guarded; if it is considered safe it must be kept safe and if doubtful it must be rendered safe by chlorination.

Since the beginning of the present year there were two serious epidemics of typhoid in Canada, one in Ontario in the town of Cochrane, the other in the Province of Quebec in the town of Mansonville. In the case of Cochrane the cause of the epidemic has been shown to be a polluted water supply. The town water supply was derived from springs which were inadequate for its requirements so that an auxiliary supply from a lake was requisitioned. The water in this lake was several feet higher than that in a chain of lakes which received the sewage of the town and communicated with one of them. Owing to the dry season last fall and the heavy demand on the auxiliary supply, the level of the lake became lower than that in the sewage receiving lakes, so that the water supply became polluted. The Town Council was forewarned by the Provincial Health authorities of the danger threatening the water supply and was advised to take measures to improve the same and guard against its contamination, but unfortunately the warning was not heeded nor the advice taken, and we see with what disastrous results. In the case of the epidemic at Mansonville, the source of the pollution of the water supply was traced to a typhoid house from which sewage flowed into a brook that entered the reservoir from which the town derived its water supply.

The lesson to be learned from these two epidemics is that we should not be over-confident but ever on our guard against typhoid, for no matter how ideal a water supply may be, there is always the possibility that infection may enter from some occult source. In this province whilst we have had no serious outbreaks of typhoid, still each fall there are small local epidemics, or sporadic cases, mostly in the rural communities.

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The medical man attending a typhoid case does not do his whole duty if he merely treats the patient, he must endeavour to get at the source of the infection and adopt all the prophylactic measures at his command in order to avoid the spread of the disease.

Tuberculosis is the most universally distributed of all the communicable diseases that affect the human race, and its ravages even extend to the animal kingdom from which it is conveyed to man in a variety of ways. Notwithstanding the warfare that is continually being waged against this dread disease it is still all too prevalent and deadly, although there has been everywhere a marked decrease in the incidence and death-rate. This decrease is accounted for by our increased knowledge of the disease, education of the public, improved sanitary conditions, and the establishment of sanitaria and dispensaries.

The tuberculosis problem is one which vitally concerns us in this province. The last report of the Canadian Tuberculosis Society contains something that should give us pause—*according to this report our province has the highest death-rate from tuberculosis of any province in Canada, the rate being given as 143 per 100,000.* This is a matter of surprise to us when we reflect that here, we have no crowding, no very poor, no slums, no sweat shops— in a word none of the conditions which would act as predisposing factors in the causation of the disease. On the other hand we have large open spaces, an equable climate, and being mainly an agricultural community, the chief occupation is farming, than which there is no more healthful occupation. There is another item in this report which is astounding—total sanitarium beds available for tuberculosis, nil. Does it not seem anomalous that the province which has the highest death rate from tuberculosis should have no facilities for sanitarium treatment? The lack of this accounts, in great measure, for our unenviable record as regards the disease, for although we have our Anti-Tuberculosis Societies and the Charlottetown Dispensary, all doing excellent work, yet we are handicapped in the fight on account of the lack of a sanitarium.

Some years ago one of our successful Islanders at home, Sir Charles Dalton, who had prospered and become wealthy in an industry in which he was one of the pioneers, knowing the ravages of this scourge by sad experience in his own family and wishing to use part of his wealth towards helping his fellow man, made an offer to the Provincial Government to build and equip a sanitarium and hand it over to the Government to be run as a Provincial Institution for the treatment of tuberculosis. This offer was gratefully accepted by the Government in office at the time and the construction of a sanitarium, to be called the Dalton Sanitarium with a capacity of about 30 beds, was proceeded with. When the building was completed the Great War was on and it was taken over by the Invalid Soldiers Commission for the treatment of invalided soldiers. Quite extensive additions were made to increase the accommodation so that before the close of the War it had become quite a large institution. Some time after the War ended, the Department of Soldiers Civil Re-establishment closed the institution and handed it back to the Provincial Government. The Government in office at that time did not see fit to operate the sanitarium, either in whole or in part, so that this munificent gift from a generous donor was rendered ineffective. There has been a breach of faith with the philanthropist who out of the goodness of his heart built and founded the sanitarium, and with the sick and needy who were destined to reap its benefits. It is the clear duty of the medical profession of this province to see that some adequate provision is made for the treatment of tuberculosis if the stigma at present on the province is to be removed, and it is only by organized and concerted effort that this can be done.

The Red Cross Society conducted a medical examination of the children of our public schools in 1921 and 1922 and whilst the survey was not complete, the results were surprising if not alarming. In the 1911 survey, which covered 20 schools, 93.8 per cent of the pupils had defects of some kind, in the 1922 survey 119 schools were covered and 88.2 per cent. had defects other than teeth. This is indeed a revelation, and when we consider that all or nearly all of these defects are preventable, we must conclude that measures should be taken at once to improve the health of our young boys and girls, if we would have them enter

the battle of life unhandicapped. In connection with the medical examination of the pupils in the school at which I assisted, I was struck with the large number of pupils who were unvaccinated. No child should be admitted to school who has not been successfully vaccinated; if this rule is not enforced, some day we will have an epidemic of smallpox and the result will be disastrous. The medical survey made by the Red Cross has demonstrated the utility of medical inspection in the schools. The conservation of the health of our boys and girls is of vital importance and will require the best knowledge and skill of preventive medicine.

A system of medical inspection of schools is absolutely necessary in this province. Governments are notoriously slow in adopting public health measures and the co-operation of the medical profession and the public is necessary to bring about any material changes. Our government gives much care to the health of foxes, horses, cows, sheep, and hogs and spends a good deal of money annually in connection with this work. All this is quite commendable, but how little attention is paid to the health of our young children, the young men and young women of the future!

If we would make any advance in matters pertaining to public health and preventive medicine, we must have a more organized profession, we must have a unity of purpose in our aims and endeavours, and in this way when we approach the Government on any matters of a medical nature, our voice will be that of a united profession, not as "the voice of one crying in the wilderness." A Department of Health is necessary in this province, and until such is instituted, the introduction of many public health measures long overdue, is likely to be long deferred.

Among our problems is a matter which requires immediate attention, and that is the matter of fees paid to medical men for services in connection with coroner's inquests. The fees for such work are laid down in a very old statute and are totally inadequate at the present day. The necessity for the revision of this statute is quite evident, but naturally nothing will be done about it until the medical profession takes the matter up and makes its recommendations. To get more than the pittance allowed by that ante-deluvian statute, one would have to depend on the integrity and fair-mindedness of Government executive officers, some of whom are lacking in these qualities.

The outstanding event in the medical world during the past year has been the discovery by Dr. F. G. Banting of Toronto University, of insulin, a new treatment for diabetes. This treatment which has been rigidly tested has given wonderful results and has been accorded world-wide recognition. Diabetes mellitus is deficiency of the internal secretion of the Islands of Langerhans of the pancreas, causing disordered carbohydrate metabolism. Insulin is an alcoholic extract of the internal secretion of the pancreas and causes marked reduction of sugar in the blood and in the urine. The chief source of insulin at present it from the pancreas of certain fishes.

The treatment is not yet available for general use by the profession on account of the difficulties attending its administration. The dosage in each case must be determined experimentally. The patient is placed on a diabetic diet, each article being carefully weighed, the amount of proteid, carbohydrate and fat estimated and also the number of calories. The administration of the drug must be checked step by step by the estimation of the blood sugar, so at present cases should be sent to one of the larger hospitals having a metabolism department where full facilities for carrying out the treatment are afforded. The insulin treatment does not supplant the dietetic treatment of diabetes, but is used in conjunction with it. It is not indicated in cases which will get along well under the regular treatment carried on in the metabolism clinics of the larger hospitals. It is specially indicated and is almost a specific in cases that are going bad and seem hopeless, in which acidosis is marked and coma present, and the results have been marvellous. After receiving the treatment the patient has to continue dieting and have blood sugar estimations and urine tests from time to time.

The discovery of insulin is without doubt the most brilliant achievement in the science of medicine in recent years. Already many lives have been saved by its use, and that the discoverer is a Canadian doctor is something for us to be proud of.

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The trend of medical practice to-day is towards preventive medicine, and owing to this, changes have been brought about in the relations between the public health official and the private practitioner, bringing them into closer contact and co-ordinating their efforts in the pursuit of a common aim and a common purpose. Great as the achievements of preventive medicine have been in the past, we look forward to still greater achievements in the future.

DIAGNOSIS OF DISEASES OF THE STOMACH AND DUODENUM*

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IN considering diseases of the stomach one feels it desirable first of all to emphasize the danger which follows from a loose acceptance by the public of a symptom, namely, indigestion, as a form of disease. It is quite unnecessary for me to tell this audience that there is no disease known as "indigestion," but I should like to point out in the strongest terms possible the dangers that have followed from permitting the public to believe that there is a *disease* known as "acute indigestion." I have never seen or known of a case of "acute indigestion" in the twenty-five years in which I have been actively engaged in the practice of surgery. I have met with many cases of acute appendicitis, perforation of a duodenal or gastric ulcer, and other acute abdominal conditions which have been wrongly considered as cases of "acute indigestion," and because of this mistake on the part of the relatives of such patients, delay in seeking medical advice has occurred until a serious condition of the patient has developed, making successful operation impossible; and in this way many valuable lives have been lost which could have been saved by an early recognition of the condition and surgical intervention. The public are altogether too prone to seek a cause for serious gastric or other abdominal troubles in some supposed error in diet, either the quantity or the quality of the food; and one cannot too strongly condemn this habit. It is the duty of the medical profession to educate the public against the danger which they run in attempting to diagnose acute illnesses. This, to my mind, is quite as important, if not more so, than the educative campaign carried on by the Society for the Control of Cancer. In these acute conditions, if physicians have the opportunity of diagnosing them within a few hours of their beginning, and surgical aid is supplied, the vast majority will recover promptly.

The most important diseases of the stomach that we have to consider are ulcer and cancer. When we realize that one-third of the cancers occurring in men are found in the stomach, and slightly more than one-fifth of the cancers in women, the importance of this disease becomes apparent.

Practically all surgeons, clinicians, and pathologists now agree that cancer may develop upon ulcer, and only the frequency of such development is in controversy; in other words, every gastric ulcer is a potential cancer. The exact starting point of cancer of the stomach is unknown, but early cancers of this organ have been seen in the mucosa of the borders of chronic ulcers. C. H. Mayo believes that more than one in six is thus developed.

Williams states that 60% of the cancers of the stomach occur at the pylorus, where only 12% of ulcers occur. Welch reports 36.5% of ulcers just above the pylorus, where 12% of cancers occur. In considering the influence of environment, practically five ulcers occur in the acid-reducing first portion of the duodenum to one in the stomach. The duodenum is resistent to cancer.

It is essential for the surgeon to be familiar with the diagnosis of gastric disorders in order

*Read before the Ontario Medical Association at Windsor, Ont., June, 1923, as part of a Symposium.

to recognize the cases which come within his domain. Recent developments in gastric roentgenology have rendered this task much easier. However, if grave errors are to be avoided he must not allow the x-ray to displace other methods of diagnosis, such as a carefully elicited history (often the most important of all), a thorough local and general bedside examination, and a chemical examination of the stomach contents.

May I here illustrate what I mean by the unwisdom of depending upon a mechanical method of diagnosis alone?

Four years ago I was asked to see a patient (Case I.) under the following circumstances. A woman, aged 45, had consulted a recent graduate because of feeling a little run down. In order to be thorough, and believing it was impossible to make a diagnosis without the assistance of the x-ray, and although she gave no symptoms whatever referable to her stomach or her gastro-intestinal tract, he had a complete gastro-intestinal x-ray examination made. The x-ray report stated that there was a persistent notch along the lesser curvature which indicated a defect, and the diagnosis was made of carcinoma of the stomach. He referred her to a surgeon, who accepted this diagnosis without further examination, and an operation was arranged for. Her husband, who was travelling in the west, was telegraphed for, and upon his arrival he asked for a further opinion on the x-ray findings, and I was requested to examine the plates. I declined to make a diagnosis on the x-ray findings without examining the patient. When I saw the patient I found her to be a well-nourished woman, weighing 150 lbs., who gave me no history whatever of any symptoms referable to her stomach; nor on examination could I find anything to indicate disease of her stomach or anywhere else. I had no hesitation in giving a positive opinion that she had not cancer of the stomach, and consequently the operation, which was arranged for the following day, was indefinitely postponed. I saw this woman two years afterwards, when she was in excellent health; and curiously enough I was called to see her about a month ago for an acute abdominal condition, due to a torsion of the right tube, which necessitated opening her abdomen. After removing the diseased tube I took the opportunity of examining the stomach, when it was found to be quite normal.

The interpretation of skiagrams of the gastro-intestinal canal requires considerable practice, and should be best done by the surgeon, who has the advantage of being able to check up the x-ray findings with the actual condition found at operation.

In arriving at a diagnosis of any surgical condition of the stomach or duodenum a definite system of examination should be carried out. There should be no difficulty in recognizing that a patient suffering from localized pain in the epigastrium, which came on immediately after taking food, and radiated to the back, with a history of having vomited arterial blood, and with a filling defect on x-ray examination, had a gastric ulcer. Or again, loss of appetite, loss of weight, anaemia, some distress in the stomach after taking food, an irregular mass in the region of the pylorus, which the x-ray shows encroaching on the lumen of the stomach, coming in a patient who had always enjoyed good digestion, are significant of cancer. These are typical pictures of surgical lesions, but unfortunately they do not always present themselves in this typical fashion, and in order to avoid errors in diagnosis we should pay special attention in the history to such complaints as *pain, motor disturbance* and *bleeding.*

Loss of appetite is primarily a constitutional symptom and as such its frequent occurrence in cancer is explained. It has little value in differentiation.

1.—*Pain,* when persistent, with indefinite onset and fairly long duration, points to cancer. The intermittent pain in the epigastrium occurring at some definite time of day and tending to radiate to the left side of the back or shoulder is indicative of ulcer. If the pain occurs in the first half of the digestive period the ulcer is usually in the stomach itself. If in the second half (hunger pain), the ulcer is situated in the neighbourhood of the pylorus or in the duodenum. In the latter case the evening meal is often followed by pain in the middle of the night. We must not, however, jump to the conclusion that hunger pain always means duodenal ulcer, because it has been

shown that it may occur without the slightest trace of ulcer. In ulcer of the stomach pain on pressure is usually on the left and radiates towards the left side of the back and left shoulder, whereas the position of duodenal pain is more towards the right.

Sudden, violent pain in the epigastrium usually means perforation. There is no pain so severe as that of perforation of a gastric or a duodenal ulcer. This pain makes the patient rigid, and he lies very quiet, with legs drawn up in an attempt to relax the muscles. There is no other acute abdominal condition besides perforation of a gastric or duodenal ulcer which makes a strong man so completely and suddenly *hors de combat*. De Quervain says that if there is any doubt about the diagnosis, if the patient has asked for an alcoholic stimulant immediately after the onset of the pain that this will settle it, because this is never done in cases of other acute inflammatory diseases of the abdomen, such as appendicitis, cholecystitis, etc., and it is because of the feeling of intense prostration. There is hardly any disease of the abdomen which has not been confused with perforated gastric ulcer, especially cholecystitis, pancreatitis, rupture of a pregnant tube, torsion of an ovarian tumor, and acute obstruction. Case 2, related at length later, deals with some phases of a perforated duodenal ulcer.

In colic the pain makes the patient restless. In acute pancreatic necrosis pain in the back is a common symptom. Reflex pain may entirely mislead one from the site of the lesion. Case 3 illustrates this. See also cases 4 and 5. Reflex pain may also constitute a complication of an already recognized gastric lesion. This was found in case 6.

2.—*Motor Disturbances.* Painful distention of the stomach after meals, visible peristalsis in the stomach and the occasional vomiting of large quantities are evidences of a narrowing of the pylorus. A classical sign of retention vomiting is the expulsion of large amounts of food residue taken one, two or more days previously, in a more or less fermenting condition. This may be purely functional or due to ulceration with spasm. It may be caused by cicatricial stenosis. Vomiting directly after meals may be due to cancer or to an hour-glass condition secondary to a stenosing ulcer high up in the fundus, as was found in case 6. Hysterical vomiting must be excluded. Vomiting from dilatation of the esophagus just above the cardiac orifice of the stomach should never be mistaken for true vomiting. If we know that stenosis is present, inquiry into the history may reveal a long duration of stomach trouble indicating ulcer. The importance of ascertaining the previous history is emphasized by case 7.

While stenosis is the usual cause of a dilated, prolapsed stomach, we must recognize that in some displacements of the stomach, even though the greater curvature is as low as the symphysis, it does not necessarily follow that the case is a surgical one. A displaced stomach will often discharge its functions quite normally, and if there are symptoms they will probably be due to the uneven muscular power rather than to the mechanical circumstance of the gastroptosis.

It is impossible to decide whether or not cancer may be developing in the scar or in the still existing ulcer in old standing cases. Hardly 2% of ulcers, diagnosed clinically, undergo cancerous degeneration. Such a change is suspected when the symptoms of an old ulcer become rapidly worse, especially the stenosis and presence of blood in the stools. A large, rapidly-forming tumour in the upper abdomen, with fruitless efforts at vomiting, should suggest a volvulus of the stomach. This condition has often been found, but has never been diagnosed.

3.—*Bleeding.* True arterial haemorrhage is the best evidence of ulceration, and should not be confounded with varicosity due to cirrhosis of the liver or tuberculosis of the lung. It is, however, not an infallible sign, as is shown in cases 8 and 9.

"Coffee-ground" vomitus means a fairly late stage of cancer. When melæna occurs it must not be confused with bismuth darkening of the stools.

So much for the consideration of the history. When we proceed to the bedside examination inspection may reveal pallor and the haemoglobin may be below 50%. This would point towards ulcer or cancer. Palpation of the abdomen may reveal a tumour in the pyloric region. If its contour can be made out, an irregularity suggests cancer, while an even cone-shaped mass with base to the left suggests an inflam-

matory condition due to an old indolent ulcer. Such an inflammatory thickening usually does not exceed a hen's egg in size, but occasionally it may be larger, as was found in case 10.

A tumour felt along the greater curvature to the left of the middle line is most likely to be a cancer. The connection of a tumour with the stomach is indicated by the fact that it can be moved around the segment of a circle, the centre of which corresponds with the position of the pylorus. The absence of evidence on palpation does not exclude ulcer or cancer. A tumour which is strikingly movable and lacks accompanying symptoms would make one think of a foreign body, such as a hair tumour. Figure I. illustrates such a tumour which I removed from a young woman, twenty-five years of age.

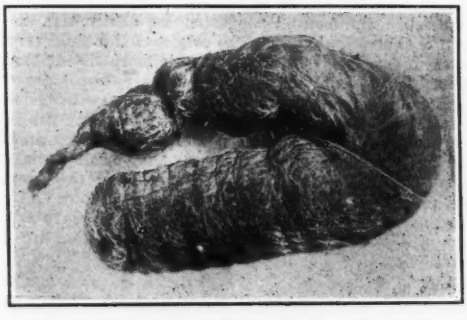

FIG. I.
Hair tumour removed from stomach.

In the further examination of the patient by the numerous clinical methods of testing the gastric mobility and the chemical examination of the secretions, it is too often found that their complexity is very much greater than their clinical value. They have almost entirely given way in favour of the x-ray. The x-ray is extremely helpful, but it cannot be relied upon alone as positive evidence. Especially may this be the case in the lower part of the duodenum, as happened in case 11.

Chemical tests. (1) A high hydrochloric acid content supports the diagnosis of ulcer. it may rarely occur in carcinoma.

(2) The absence of free hydrochloric acid and the presence of lactic acid supports the diagnosis of carcinoma.

(3) The presence of blood usually indicates ulceration, but it is indispensable in doubtful cases that the stools be examined repeatedly for chemical traces of blood, after two days' abstinence from meat diet. The more constantly blood is detected in the stool the more suggestive of cancer is the case, because the admixture with blood is very irregular in cases of ulcer.

Case 2.—Slobod. First seen in consultation with his doctor in September, 1921, when I made a diagnosis of perforated duodenal ulcer, confirmed by operation the following day, at the Toronto General Hospital, when the perforation was closed and drainage instituted. He had been in the medical department of the Toronto General Hospital under observation for some time immediately preceding this, and had had x-rays made of his stomach, duodenum and gall bladder, when a diagnosis of gall stones was made from the x-ray findings. In closing the perforation considerable narrowing of the duodenum resulted, which I felt at the time might necessitate a gastro-enterostomy later. His condition then was too serious to justify such a procedure. Following his operation he developed pneumonia, and was very ill for two or three weeks. A few months later he was still complaining of gastric trouble, and I recommended a gastro-enterostomy, which was performed on March 2, 1922, from which he made a good recovery. However, he returned in October, 1922, complaining of pain in the epigastric region. I sent him to the Toronto General Hospital for x-rays, and the radiologist reported that all the food was passing through the artificial stoma; that the stoma was not filling well; that the pylorus filled well and that the caput never filled. His diagnosis was, "Negative for gastric carcinoma and ulcer. The portion of the bowel adjacent to the enterostomy is not normal and has the appearance of being held by adhesions." I advised further operation, which was done on May 3, 1923.

On opening the abdomen I found the jejunum immediately distal to the gastro-jejunostomy held firmly in contact with the transverse colon and adherent to it. This adhesion was about 2 inches from the stoma. On careful examination I found an excavated ulcer on the jejunum, which did not appear to penetrate the transverse colon. The jejunum was separated from the transverse colon, when a large, punched-out ulcer, as large as one's index finger, was disclosed. This was sutured, and the adhesions about it separated.

He made a good recovery from this.

Case 3.—Mr. J. B. Aet 42. He was admitted to a medical division of the Toronto General Hospital with a diagnosis of "angina pectoris." The very typical pain constituted his main symptom, while the complaint of "indigestion," *i.e.* slight abdominal discomfort, belching of gas and occasional vomiting, occupied such a minor place in his thought as to be only brought out by close questioning. The x-ray revealed a large ulcer on the lesser curvature of the stomach, and he was transferred to my service, where a posterior gastro-enterostomy was done, giving complete relief to the pain and other symptoms. The ulcer was glued to the under surface of the left lobe of the liver.

Case 4.—Mrs. D. Aet 68. First seen by her doctor about one week before laparotomy. She had been complaining for six or eight months of lassitude, some indigestion and pain in the precordial region, and had been treated by hypodermic injections for artero-sclerosis and angina for at least four months. Previous to this she had complained of very little indigestion and no abdominal pain; she had lost no weight, but showed a marked secondary anaemia. At the time when patient was first seen no tumour could be felt, but a sense of fullness in the epigastrium was manifest. x-ray showed pyloric stenosis with dilatation. *Diagnosis*—Carcinoma of pylorus.

At operation a very large mass was found surrounding the pyloric end of the stomach, quite 3 inches in transverse extent, clearly carcinoma. There was also a distinct secondary growth in the omentum, which was enormously enlarged. A posterior gastro-enterostomy was done with great difficulty on account of the enormous omentum and the stoutness of the patient, and the fixity of a portion of the stomach. She made a good recovery and had at least four months of comfort before her symptoms again became distressing, ending fatally at the end of six months.

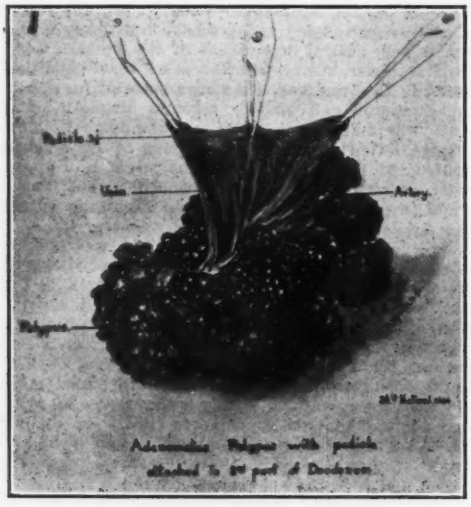

FIG. II.
CASE XI.—Drawing of Tumour.

Case 5.—Mr. H. W. Aet 62. Gave a history of some gastric disturbance for a period of eight or ten years. Was taken with severe pain below the ribs on the right side, for which a hypodermic of morphine was given. This pain continued from 9 o'clock at night until I saw him the following morning at 11 o'clock. By that time he had had altogether 1½ grs. morphine, and he was sitting up in bed with an anxious expression; the muscles of his abdomen were rigid, and he was still suffering agonizing pain, which he referred to the upper part of his abdomen. He was sitting absolutely rigid, the slightest movement increasing the pain. He had been told many years ago that he had gall stones, and assumed that the recurring attacks of pain from which he suffered were due to this cause.

It was quite clear from the appearance of the patient as given above that he was suffering from perforation of the duodenum or stomach. He was moved to the hospital, when a large duodenal perforation was found and closed. Subsequently a subphrenic abscess developed, which was drained, and six weeks after operation, when he seemed to be well on the way to recovery, he died suddenly from a pulmonary embolism.

Case 6.—Miss C. S. Aet 35. This patient came under my care recently for the relief of an hour-glass stomach. She could take very little food, and this was always vomited almost immediately unless it was fluid in character. She complained of an agonizing referred pain in the shoulder and back, and as the ulcer involved almost the entire circumference of the upper third of the stomach and was glued to the under surface of the left lobe of the liver, with a large excavation of its substance, the cause of the pain may have been either an involvement of the vagus or the phrenic, or a combination of the two. The stomach could not be separated from the liver in this case, and to relieve the obstruction a gastro-gastrostomy was done. Her general condition was greatly improved, but the referred pain was not relieved, but could be controlled by medication directed to the surface of the ulcer.

Case 7. A Russian, 28 years of age, who could not speak English, was admitted to the medical division of the Toronto General Hospital several years ago, when the diagnosis lay between an acute appendix, gall bladder or duodenal or gastric ulcer was made, and he was transferred to my service for operation. He was suffering intensely with pain in the epigastrium, vomiting repeatedly large quantities of dark brown fluid, in spite of the fact that none had been taken by mouth, and with a visible peristaltic wave passing from left to right across the epigastrium about every two minutes. It was now clearly pyloric obstruction, and as the vomiting did not relieve him, one of my assistants opened his abdomen, and finding an enormously distended stomach with thickened walls and complete obstruction at the pylorus, performed a posterior gastro-enterostomy, giving complete relief. The sudden severity of his symptoms was most unusual in a case of pyloric obstruction gradually developing during four years. A subnormal temperature and the vomiting of large quantities of dark brown fluid—as much as 80 ounces in four hours, none of which had been taken by mouth—suggested an obstruction lower down the intestinal tract. The origin of this fluid reveals a most interesting fact, *viz.* that an abnormally distended stomach, completely obstructed at the pylorus, preventing any regurgitation from the duodenum, with oedematous and congested walls, is capable of secreting fluids at the rate of an ounce in three minutes. When such an outpouring of the fluids of the body can occur from the stomach alone, one can readily understand the gravity and extent of obstructive lesions lower down in the intestinal tract, and an explanation for the grave symptoms which occur secondarily to the depletion of the body fluids.

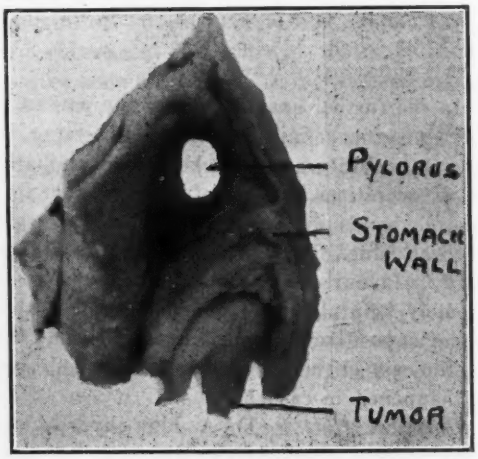

FIG. III.
CASE 8.—Photo of Stomach Tumour.

Case 8.—Mr. A. T. R. Aet 60. A severe haemorrhage (said to be about 1 quart), which caused him to collapse, occurred quite suddenly one evening. He was so exsanguinated that a blood transfusion was performed on him the next morning. He made a good recovery from this, and three weeks later, after another transfusion of blood, the abdomen was opened, when a hard lump was felt at

the pyloric end of the stomach. This lump was on the anterior wall, about 1 inch from the pyloric ring, its base seemed to be about 1½ inches in diameter, and it projected into the stomach to the extent of about 1½ inches. A posterior gastro-enterostomy was first done, and was followed two weeks later by a pylorectomy. The tumour at the time was thought to be malignant, but on microscopic examination was reported by the pathologist to be a fibroma. I have had this specimen re-examined by another pathologist, who reports that it is a haem-angio-endothelioma. There are numerous young blood vessels seen, with whorl formation of spindle cells, plasma and lymphocytic infiltration.

This is such an unusual case that I think it worth while to give some further details. The patient had symptoms of "indigestion" for ten years. For the last few months he had attacks of severe abdominal pain in the epigastric region, usually relieved by vomiting. (This was explained after the operation by the character of the growth, which was situated near the pylorus, permitting it to act like a ball-valve and block the pylorus—figure 3.) His condition was complicated by the fact that he had had a small renal stone two years previously, which gave a great deal of pain until passed. X-ray report stated, stomach examination negative for gastric ulcer or gastric cancer, but the duodenum showed a suspicious puckering which was suggestive of duodenal ulcer. It may be of interest here to note that this patient was treated in New York by what was called "gastric massage." As far as I can learn this consisted in passing a rubber tube into the stomach and inflating the stomach with air. This treatment preceded the gastric haemorrhage by a few weeks. The patient is now in excellent condition, over four years since operation.

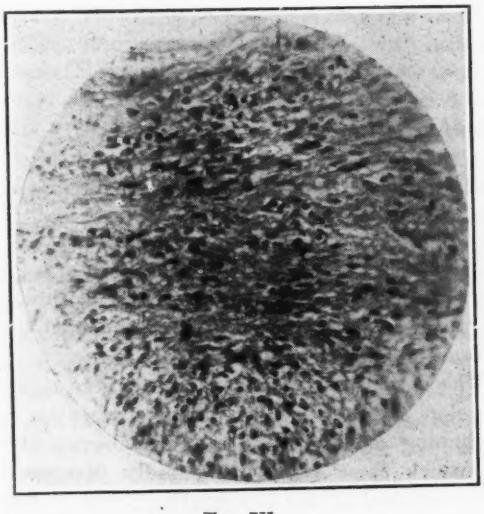

FIG. IV.

CASE 8.—Photomicrograph of Stomach Tumour.

Case 9.—Mr. G. Y. Aet 47. I recently had a patient sent into hospital from a neighbouring town the day following a very severe gastric haemorrhage, in which he was said to have lost a quart of blood. He gave a history of having had attacks of abdominal pain for some years at intervals of a few months, and three years ago had a severe gastric haemorrhage following an attack of influenza. He had had attacks of haematemesis at long intervals. During the last three months he complained of great muscular weakness. His red blood count showed secondary anaemia, and a diagnosis was made of pyloric cancer. When admitted to the hospital he was in a very critical condition, but picked up somewhat after a transfusion. However, three days later he again commenced to vomit what appeared to be pure blood, filling

FIG. V.

X-ray photo of Ulcer of Stomach causing Hour-Glass constriction.

FIG. VI.

X-ray photo of Cancer of Stomach causing Hour-Glass constriction.

a pus basin. The following day he vomited twice, on each occasion filling a pus basin with apparently pure blood, and was again transfused, but died a few hours later.

A portmortem was done, when the lower end of the oesophagus, the entire stomach, and part of the duodenum were examined and found to be in normal condition, with no evidence of ulceration, cancer or growth. The spleen was about five times the normal size and adherent to the diaphragm, and the capsule was five times its normal thickness. The liver showed early cirrhosis. This was evidently a case of splenic anaemia (Banti's disease).

Case 10.—S. G. Aet 30. A nurse, gave a history extending over 15 years during which time she had been seen by many medical men, all of whom made a diagnosis of gall stones. While engaged in nursing a patient she was suddenly taken with severe pain in the epigastric region, extending through to the back, and causing faintness but not collapse. The large mass felt in the hypochondrium was thought to be a distended gall bladder, and the attack, gall stones. She was given a hypodermic of morphine and sent into the hospital, where she remained three days before operation. At operation a uniform tumour, about as large as a goose egg, was found in the anterior wall of the stomach about 1½ inches from the pylorus, having a small perforation in its centre which would admit a small lead pencil, and which was sealed over by the omentum. This mass was assumed to be carcinomatous, however a small piece at the edge of the perforation was removed for microscopic section and the perforation closed. The pathologist reported it to be inflammatory tissue. Owing to the very great size of this inflammatory mass and the possibilty of cancer developing later upon it, I advised its removal, but as the patient made such a splendid recovery she did not accept my advice . About twelve years later I performed a hysterectomy upon her for a large fibroid of the uterus, and at this time took occasion to examine the stomach, when I found the mass had diminished to one-quarter of its original size. It is now twenty-five years since the original operation, and she is still nursing.

Case 11.—Mrs. B. Aet 45. Ten years ago I removed an adenomatous polypus originating in the second part of the duodenum. She had had a hundred x-ray pictures taken in New York, from which a diagnosis of enlarged gall bladder pressing on the duodenum was made. The clinical diagnosis was obstruction of the duodenum, probably from a cicatricial ulcer. At operation an adenomatous polypus, as illustrated, was removed from the second portion of the duodenum. The patient had immediate relief of her symptoms and has continued in good health since.

Case 12.—Mrs. C. B. Aet 46. She had, for several years, symptoms of duodenal ulcer, confirmed by x-ray. She also had had several definite attacks of appendicitis. Believing the appendix had some relationship to the duodenal ulcer, we got her consent to the removal of the appendix. This was done with a para-rectal incision, when we found a scarring of a partially healed duodenal ulcer. The appendix was thickened and obstructed, and was removed. This operation was performed ten years ago. She made a good recovery, and in a few months time all her duodenal symptoms disappeared and have not returned. I saw her a few days ago, and she was in splendid health.

SEROUS MENINGITIS OF OTITIC ORIGIN*

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SEROUS meningitis as a complication of otitis was first discussed by Quincke.[1] The characteristic anatomical features of the disease are a serous infiltration of the pia mater, and an increase in the cerebro-spinal fluid in the subarachnoid space and in the ventricles of the brain. The surrounding brain tissue is infiltrated with serous exudate. According to Hammerschlag[2] the sigmoid sinus can be completely compressed by a large collection of fluid in the ventricles.

Serous meningitis is met with less often in acute than in chronic suppurative otitis and is a result of inflammatory irritation of the meninges, secondary to suppuration in the temporal bone. It may be associated with an extradural abscess or may be complicated by a brain abscess or a sinus thrombosis.

The diagnosis is made in cases where there develop a group of symptoms suggesting a beginning meningitis or a brain abscess but in which these symptoms rapidly disappear after removal of the suppurating focus in the temporal bone and incision of the dura without finding any evidence of brain abscess. The clinical symptoms do not differ to any extent from those of an early purulent meningitis or a brain abscess, but the clinical course is very different. Unrelieved by operation it may go on to death, but if the seat of infection is thoroughly removed and the dura incised the symptoms subside rapidly.

*Read before the Eye, Ear, Nose and Throat Section, Canadian Medical Association annual meeting, Montreal, June 1923.

While cases of recovery have been reported where turbid fluid was found on lumbar puncture and a diagnosis of purulent meningitis established, this is quite unusual and the recovery of the case usually indicates a serous meningitis. Present opinion is rather against the performance of a diagnostic lumbar puncture in these cases as it is believed to favour the spread of infection in cases where the meninges may be at the time only locally involved. It is preferable in all cases suggesting this condition to thoroughly remove the diseased bone and incise the meninges, thus relieving the increased pressure and at the same time favouring the flow of cerebro-spinal fluid towards, rather than away from, the primary focus.

Diagnosis is established when this procedure has been carried out and a large amount of cerebro-spinal fluid escapes and the meningeal symptoms rapidly subside. If the severe symptoms continue after the incision of the dura it points rather to the presence of a brain abscess.

In a recent paper, Aboulker[3] reviews the subject, and reports a case in his own practice where the symptoms had developed some weeks after a simple mastoid which had failed to heal. The patient recovered from the meningeal symptoms but died some time later of tuberculosis and he was inclined to the opinion that in his case the serous meningitis was of a tuberculous origin secondary to a tuberculous mastoiditis.

The present case presents a fairly typical picture and is instructive as showing how alarming the symptoms may become and still recovery take place. In a former case I had a somewhat similar result, and such unexpected recoveries make one more optimistic as to the results of operation in the presence of serious intercranial symptoms.

The report is as follows:

N. L. Aged 53 years. Admitted to Royal Victoria Hospital, 12 December, 1921, complaining of a discharge from the left ear. Patient states that two months ago the ear pained him for a few days and then began to discharge. He has had very little pain since the discharge started, but the discharge has been persistent since onset. There has been no pain in the region of the mastoid, or headache.

Present condition.—Patient a thin sickly-looking man, but friends state that this is his usual appearance. There is no disturbance of temperature or pulse. The left ear shows a profuse purulent discharge without any foul odor, the canal is much narrowed by swelling of the posterior wall, so that it is impossible to see any details of the drum. Hearing normal on the right, only loud voice at ear on the left. Weber's test, the sound referred to the left ear. No nystagmus or other evidence of vestibular disturbance. X-ray of the mastoids shows a marked blurring of all the details on the left side. Physical examination of heart and lungs made by Dr. Hardisty, negative.

Diagnosis.—Acute suppurative mastoiditis, operation advised.

On December 14th a simple mastoid operation was done. There was no evidence of swelling or reaction in the soft parts, and the outer table was very hard and thick. On removal of the cortex the body of the mastoid was found broken down into a large single abscess cavity the size of a large cherry. The dura was exposed and formed the posterior wall of the cavity. The sinus wall was covered with thick granulations, and in one spot somewhat discoloured. The mastoid cavity was widely opened and the tip removed. Towards the end of the operation a small wound of the lateral sinus occurred, but was easily controlled by a light packing of gauze.

Dr. Bruère reported that the organism found in the pus was *Streptococcus haemolyticus.* The patient did very well during the next few days, and by the end of the week was out of bed and apparently convalescent. During this time there was no rise of temperature or pulse disturbance.

On the morning of the 21st of December, one week after the operation, the patient had a sudden attack of dizziness during the dressing. He was sitting up during it, but there had been no previous complaint at former dressings. He suddenly complained of feeling faint and dizzy and became rapidly unconscious. Pulse weak and rapid, marked disturbance of respiration with cyanosis. He was lifted back into bed, but did not recover for some time.

On examination of the eyes there was a marked nystagmus to the left, and concomi-

XUM

tant deviation of the eyes to the left, but no convulsive movements of trunk muscles or extremities. Breathing irregular and laboured.

The attack lasted for about an hour, after which his condition seemed fairly normal as shown by Dr. Russel's report which was made an hour or so later, and was as follows: "Mentally clear and intelligent. Fundi normal. (This was confirmed by the ophthalmologist Dr. McAuley). Pupils equal and active to light and accommodation. Ocular movements normal. No nystagmus. Fifth motor and sensory, 7th, 9th, 10th, 11th and 12th cranial nerves show no abnormality. Muscular system, no atrophy. Tone normal, equal on both sides. No incoordination, power good. Sensory system negative. Reflexes all normal, equal on both sides. Plantars flexion. Abdominal and epigastric active, equal. No Rombergism. No swaying to either side in walking. No headache, no vomiting. Suggest symptoms due to labyrinth irritation. No evidence of intracerebral abscess."

At 2 p.m. patient had an attack similar to the one in the morning but more severe. It was therefore decided to explore the wound in the hope of finding some focus which was causing the disturbance.

Second operation 21st December, 1921.—On this occasion a radical mastoid operation was carried out and the dura of the posterior and middle fossae widely exposed. The bone of the mastoid showed evidence of inflammatory change, but there was no focus of retained pus demonstrated, nor was any further epidural abscess opened. No gross evidence of involvement of the dura beyond the perisinus abscess already mentioned. At the end of the operation the dura was incised in the region of the posterior and middle fossae and cerebro-spinal fluid escaped freely. Wound packed in idoform gauze.

On the following morning (December 22nd) patient's condition was not very good. His mental condition was much clouded and his general appearance very bad. His temperature rose to 102° and pulse 120, of poor volume and tension. Dr. Russel made the following report: "Patient lies with eyes open and is intelligent looking. Moves left arm freely and puts it to his head. When irritated moves both legs as far as one can see equally well. Will not respond to command or question save with irritated look. (Aphasic?). Pupils equal and active to light. No facial asymmetry can be made out. Reflexes:—both knee jerks obtained, not exaggerated. Plantars both flexion. Abdominal and epigastric not obtained. Arm jerks present on the left side, absent on the right. Suggest cerebral lesion, probably inflammatory. Internal capsule anterior part (?)

In the afternoon of the same day (December 22nd) patient's condition seemed to grow worse, and he had every appearance of sinking into deep unconsciousness. His general condition certainly suggested a rapidly approaching termination. As the localization was indefinite and the man's general condition looked so desperate it was decided not to undertake any further operation.

On the following day there was a striking improvement both in the mental state and the general condition. He had recovered consciousness and talked fairly intelligently. Report of Dr. Russel on the 23rd as follows: "Patient much improved. Talks fairly intelligently, perhaps slightly confused. Fundi normal. Pupils dilated. Ocular movements normal. Cranial nerves normal. With the Weber tests the sound was referred to the right ear. Can move the right arm quite well. Power good. No incoordination or involuntary tremor. Reflexes normal. Patient has no remembrance of former examination."

This improvement continued uninterrupted until the man's recovery was complete. On the 11th of January the plastic operation was done, and the wound cavity grafted with skin. On the 27th of January patient was discharged in good condition, though the epidermization was not quite complete.

March 6th, 1922, the patient reported in good condition. Health now as good as ever. Ear healed. Cavity shows considerable contraction, but healthy. The Eustachian tube persists open, but not discharging.

I have to thank Dr. Colin Russel of the Royal Victoria Hospital for kind co-operation and advice in the treatment of the case, and the reports of the neurological examinations. Also Dr. McAuley and Dr. Hardisty for special examinations.

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SOME OBSERVATIONS ON SCHOOL HEALTH SUPERVISION IN RURAL AND URBAN CENTRES*

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IN reviewing the literature dealing with this subject, much of interest can be discovered, chiefly applicable to the hopes and reasons that prompted its inception in various countries and communities. The first worth-while note is to be found in a report submitted by a small committee of its members to the National Convention in France in June 1783, which reads as follows: "A district health officer shall be entrusted with visiting each quarter, the national schools of the district. He should examine and give advice regarding the most suitable gymnastic exercises. He should examine the children and lay down general and detailed rules for the safeguarding of their health.[1]" This comprehensive and far-reaching programme unfortunately was not possible of adoption, owing to the disturbed condition of affairs during the Revolution. As to the type of work done, it is worthy of note that in France, where the work was inaugurated in 1834 and firmly established in 1883, it is only within very recent years that the interest of the school health staff in the individual child has superseded the consideration of the well-being of the school as a whole. A sanitary survey and an attempt to control communicable disease was the evident aim of the school medical officer. This criticism, however, is only applicable to some centres, the plan adopted in Germany, generally described as the Weisbaden plan, seemingly having for its objective a large interest in the physical condition of each pupil presumed to be subnormal.

Some of the dates that stand out in the history of this movement are those associated with its extension to North and South America, Australia, Japan, and its nation-wide adoption in England and Wales. The city of Boston is usually credited with having the first school health service in the United States, begun in 1894. The Republic of Argentine instituted a very important programme in the early nineties, and Japan and Great Britain adopted it in a national way, the former in 1898, the latter in 1907. The year 1894 is also worthy of mention as the one in which school nursing had its beginning on a small scale in London, England. The almost universal adoption of this service in some form throughout the civilized world, has been so exceedingly rapid that there is practically no urban centre of any size but that has some type of school inspection by nurses or physicians.

A brief word in passing as to the aims of the work, and some mention of the early and, in some places, present criticism of it by the medical profession are here inserted. While primarily its inception was prompted by a desire to combat communicable disease and to supply the necessary sanitary supervision of school buildings and, in some countries with military aspirations, to circumvent any attempt at evasion of the required gymnastic exercises and drill on the plea of ill-health, the full possibilities of the service are to-day widely recognized, and are aptly put by Dr. Cornell,[2] as follows: "(1) the detection and correction of physical defects. (2) the detection and exclusion of cases of parasitic and communicable disease. (3) the maintenance of good hygienic conditions in the schools. (4) the diagnosis and treatment of cases of mental subnormality. (5) the correlation of medicine and pedagogy in order to produce the maximum of efficiency in the school system consistent with the preservation of health."

Presuming that Dr. Cornell includes in the last of the aims mentioned, the need for an early adoption of a more tangible, concrete, and comprehensive programme of health teaching throughout both grade and secondary schools, from kindergarten to graduation, I see

*Read before the Section of Preventive Medicine and Hygiene, Academy of Medicine, Toronto, March 29, 1923.

no reason why we should not all subscribe to the above statement of the objects of school health supervision. That the immediate need for the placing of a larger measure of emphasis on this last mentioned aspect of the work, is very necessary, especially in view of the importance too often attached to the corrective side, is rapidly becoming appreciated by all, in fact the statement that the future of preventive medicine is largely dependent on a more widespread and thorough adoption of real HEALTH teaching in the schoolroom is not by any means an exaggeration.

Much of the criticism that has been directed at this service emanated from the medical and dental professions. Whether this criticism is warranted or not is a question that interests exceedingly those actually carrying on the work. Criticism levelled at certain individuals associated with school medical and dental inspection, especially in its pioneer days, was sometimes more than merited, but that SCHOOL HEALTH SUPERVISION in its most desirable form is an attempt to supplant the family physician or dentist, is a statement probably less applicable to this type of preventive medicine than it is to any of the other more generally recognized legitimate public health activities.

There are three types of school health service in vogue in various parts of this continent, and these I mention but briefly; first, that carried on by a physician working alone, in which he visits the school periodically once, twice, or three times a year, and by means of an examination, of necessity superficial, presumes to suggest that certain children need treatment for certain conditions presumed to be present. This is merely a stop-gap type of service, and is of doubtful value. A second method whereby a nurse works alone, is the method perhaps the most general of adoption in the smaller centres and is the one most often criticized. In defence of this plan I would say that as the discovery of children who are physically below par is but one of the objects of this service, and as the question of diagnosis and treatment is to be left to the family physician or dentist, I feel that a well-qualified school nurse, taking advantage of all the opportunities that present themselves for selecting such cases, should be able to render fair service. Keeping in mind the educational possibilities associated with intelligent home visiting and health teaching, I personally feel that this is a more desirable type of service than the one previously mentioned. The third and most worth-while plan is where a capable physician, working with a desirable type of school nurse, assumes with her the various duties associated with a reasonably efficient form of school health supervision.

While it was not my intention in presenting this paper to dwell at any length on the history of the movement, I have felt that some such introduction was necessary for a better understanding of the aftercoming observations and I offer this as my excuse for the time already taken up.

During some twelve years spent in part or full time school health work, it has been possible to gather some facts and figures, which I am hopeful will be of at least passing interest, and these I will attempt to present as accurately and briefly as possible, making such qualification as the circumstances demand.

	Figures for 1912	Figures for 1922
Number of children examined ...	21,136	23,639
Total no. of defects	11,040	9,258
Defective vision	1,940	1,186
Defective hearing	199	276
Defective nasal breathing	2,313	1,864
Abnormal Tonsils	3,823	3,681
Enlarged glands	2,536	264
Pulmonary disease	43	98
Cardiac disease	69	165
Nervous disorders	15	99
Orthopedic defects	89	62
Malnutrition	285	1,563

In comparing the findings of the school physicians for the year 1911-12 (the first year of this work in Toronto) with those of the present day, I appreciate the necessity of making due allowance for conditions existent then and not present in 1922, such as the lack of standard methods of examination and the recording of results, a too superficial type of inspection, the presence on the staff of a group of physicians who thought only in terms of treatment and not of prevention, and in some instances possibly the desire on the part of a few members of the staff to pile up evidence of their industry rather than to discover children with actual defects needing present treatment. But giving due consideration to all the possible contributing factors which might influence any difference which is apparent in the findings given

below, there is still sufficient evidence to show that the work done in the early days of the service in the community mentioned was of a distinctly worth-while type, and that on the whole it did not warrant the criticism it received.

The wide difference in the figures as they apply to some defects is possible of ready explanation, as for example, there was undoubtedly ten years ago, altogether too much significance placed on the presence of enlargement of the precervical glands associated with carious teeth. The variance in the number of those dubbed "malnourished" is largely due, not to the absence of such children at the earlier date, but to the very recent emphasis which has been placed on this sign. The difference in the number of cardiac affections is largely due to the more thorough method of examination now in vogue, but as for the large preponderance of nervous disorders in 1922 I have no explanation to offer.

Owing to the lack in certain communities of sufficient personnel to serve the entire school population adequately, certain age groups are selected as those having the primary call on the services of the school health staff. In justification of this selective method it has been deemed wise to present some facts as to the age incidence of physical defects among school children, and in deference to the much larger group under observation, I am inserting the findings of Dr. Baker[3] of New York City, in preference to my own, noting only the differences between them at the close of the paragraph. The conclusions of Dr. Baker are that the major physical disabilities are little, if any, affected by the age of the pupil, that defective vision is markedly increased as the age of the child and his stay in school increases, that deafness is slightly increased, and that defective nasal breathing, abnormal tonsils, defective teeth, and malnutrition, reach the highest incidence level among the group just entering school. The Ontario figures differ only from the above in that deafness remained about the same, and that malnutrition (so-called) was about as common in the age group composed of those children between 12 and 15 as those between 6 and 8. These figures are not only interesting but are of material use in planning the work so that the most can be obtained for the effort expended.

Having in mind the local application of the old adage "that the proof of the pudding is in the eating," I have felt that our contention that the relatively large group of subnormal children who are referred for treatment, are definitely handicapped, and that the correction of the defect or defects present would remove this handicap, was fairly patent. I present, however, for your discussion the following conclusions obtained from the observation of a group of Toronto children, who had been successfully treated for abnormal tonsils and adenoids. I am indebted to Dr. Fleming and his staff for their cooperation in obtaining these figures.

Four hundred and twenty-seven children were included in the survey. The treatment was followed by mental improvement in 271 cases or 63%. No improvement was noted in 73 cases, or 17%. Information was not given on 83 cases, or 20%. As far as degree of improvement was concerned, mental improvement was "remarkable" in 33 cases, or 8%. The child progressed to normal in 36 cases, or 9%. There was "improvement" (unqualified) in 178 cases, or 42%. The improvement was "slight" in 24 cases, or 5%. The treatment was followed by physical improvement in 400 cases, or 94%. No improvement was noted in 18 cases, or 4%. Information was not given in 4 cases, or 2%. The physical progress was exceptional, in 37 cases, or 9%. The child progressed to normal in 29 cases, or 7%. There was improvement (unqualified) in 226 cases, or 53%. The improvement was slight in 108 cases, or 25 %.

The question of the relation, if one existed, of the presence of physical defects to school progress, prompted the examination of the physical record cards of some 2,000 children in the junior grades in some of the large urban schools. The findings are as follows:

Average age of children with no noted physical defect in Sr. I. grade, 8.29 years; average age of children with one physical defect, same grade, 8.49 years; average age of children with more than one physical defect, same grade, 8.70 years; average age of children with no noted physical defect in Jr. II. grade, 9.23 years; average age of children with one physical defect in Jr. II. grade, 9.57 years; average age of children with more than one physical defect in Jr. II. grade 9.70; average age of children with no noted physical defect in Sr. II. grade, 9.93; average age of children with one physical defect in Sr. II grade, 10.67; average age of children with more than one physical defect in Sr. II. grade, 10.69 years.

Feeling that possibly many of these children with defects entered school at a later period than those not so affected, the survey was extended to include the length of time at school in months.

Children with no apparent physical defects in Sr. I. grade, 16.4 months; children with one noted physical defect in Sr. I. grade, 17.8 months; children with more than one physical defect in Sr. I. grade, 19.6

In Jr. II. grade

Children with none, 24.5 months; with one, 26.9; with more than one, 28.1

In Sr. II. grade

Children with none, 32.1 months; with one, 37.7; with more than one, 35.8.

No apparent explanation existed for the absence of the previous definite relationship between the presence of one and of more than one defect in the last grade mentioned.

A recent survey of the district of Haliburton and part of Muskoka, made partly with the hope of throwing some light on the incidence of thyroid enlargement in this section, prompts the rather startling statement that among the 1,721 children examined, 489 suffered from this pathological condition. That the possible significance of the condition was considered lightly by those affected, does not tend to minimize the seriousness of the problem associated with its eradication.

I wish to insert here the results of the surveys made in rural Ontario by the Departmental staff during 1922, and set alongside of these the Toronto findings of 1912. In doing this I am not intentionally contributing anything to the useless discussion as to whether physical disabilities are more common among urban than rural children, but merely to emphasize the presence of conditions which in 1912 in Toronto, and in 1922 in rural Ontario, demanded early correction.

	Rural Ontario 1922	City of Toronto 1912
No. of children examined	23,944	21,136
No. found with defective vision	2,297	1,940
No. found with defective hearing	606	199
No. found with defective nasal breathing	2,814	2,313
No. found with abnormal tonsils	4,161	3,823
No. with enlarged glands including thyroid	1,168	2,536
No. with pulmonary disease	101	43
No. with cardiac disease	344	69
No. with nervous diseases	332	15
No. with diseases of the skin	508	
No. with orthopedic defects	341	89
Total no. of defects found other than teeth	12,164	11,027

That there is a very evident need of the early adoption throughout the province of measures which will tend to remedy existing conditions, is fully apparent and requires no further comment.

In order to avoid criticism in a further series of associated figures dealing in this instance with the prevalence of malnutrition among school children, I am taking as my medium for comparison the results obtained in the nutrition survey of Drs. Brown and Davis,[4] made some four years ago in Toronto schools, and a survey made by Dr. L. G. Neelands in the counties of Kent and Brant during 1921-22, using the "weight for height" standard as an index. The number of rural children examined was 1,974. The number found below the standard set was 430 or 21.78%, the percentage of these showing no other apparent physical defect was about 10%. The findings of Drs. Brown and Davis, which included a larger number of children but with the same standard of measurement, in the city survey were 26% for all ages.

Owing to the seeming value of such a survey, I wish to give here the very interesting findings of S. D. Collins of the U. S. Public Health Service,[5] on the relation of physical defects to absence from school. These figures were gathered in the State of Missouri, include children from four small urban centres, numbering in all 3,786, ranging in age from 5 to 20 years, and, while conditions of school attendance in Missouri differ considerably from those in Ontario, the figures are of value in that they are the only ones of their kind I have ever seen. He says, "The rate of absence from sickness for children with defects is 22% greater than the rate for children with no defects, and the groups with defects were also absent from other causes than sickness, more than those with no defects. The rate of absence from sickness for children with enlarged or diseased tonsils is 12% greater than the "no defect" rate, and the rate for children with adenoids and defective tonsils, associated with other defects, is 31% greater than the rate for the children with no defects. The rate for children with defective vision was 9% greater, and the rate for children with decayed teeth was 3% greater than the "no defect" rate.

While it is impossible, owing to the lack of

adequate follow-up work in the whole of the rural area surveyed, to present any very accurate report of the corrections obtained, much of interest is shown in some of the reports sent in from the districts in which follow-up work is carried on. I will therefore give two or three of these selected at random for the year 1921. I ask you to note that in no instance in the list given was the treatment carried out by any but the family physician or dentist, or under his direction.

Unit No. 1, Halton County.—Terminations other than teeth, 578; of teeth only, 232; total 810. Unit No. 2 Peel County.—Corrections of teeth only, 254; of defects other than teeth, 287; total 541. Unit No. 3, Welland County.—Corrections of teeth only, 369, of defects other than teeth, 372; Total 741.

While these are but a few examples of the results being accomplished outside of the larger centres, they will serve to show that there is a very ready response to any practical attempt at the solution of this problem in the rural and small urban areas.

In conclusion I am desirous of outlining the school health programme of the Provincial Department of Education, which department exercises supervision over this service in all rural areas and in the urban centres having a population of less than 200,000. The Division of School Hygiene maintains a field staff of physicians and nurses, whose chief duty is to arouse the interest of the public in this service in the rural districts, and to offer a temporary form of school medical inspection in the more sparsely settled portions of the province. On the entry of the physician and nurse into a county or portion of a county, a survey is made which includes the physical examination of all children of school age, notification of parents of defects found, and the making out of an accurate record of the findings on the standard form supplied. A report of the sanitary condition of the building and grounds is also made out and, coupled with whatever recommendations deemed necessary, is sent on to the local Board. Any follow-up work thought to be urgent is also done by the nurse who accompanies the physician. At the conclusion of this survey, sufficient of the local boards are urged to unite to make some practical form of permanent service possible. In the event of the formation of a unit, (which is the area to be served by a full time school nurse and must not contain more than forty class-rooms, and should be so situated geographically that transportation of the staff is not too difficult) the Department aids in the inauguration of the permanent organization, maintains regular supervison over the appointee, and assists in defraying the cost of the service by an annual grant of $10.00 per class-room. That the plan is feasible and of value is evidenced by the fact that while the first of these rural units was established first in February, 1921, there are now 22 of them in actual operation throughout the province, and present indications promise a material increase in this number during the year 1923.

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The Development of Intestinal Surgery.—Harry Hyland Kerr, Washington, D.C., concludes his review of the development of intestinal surgery as follows: The history of intestinal surgery is punctuated by the gradual establishment of definite surgical principles. Intestinal wounds heal, not by reciprocal healing of adjacent cut edges, but by adhesion of the inverted peritoneal coats. Each bite of the suture should be securely anchored in the fibrous coat, thus necessitating only one suture. All openings of the intestine, whether perforations or anastomosis, should be closed transversely by a continuous suture. Ideal aseptic intestinal resection is readily performed by the basting stitch method. The method is applicable to all forms of anastomosis of viscera covered by peritoneum.—*Jour. A. M. A.*, Aug. 25, 1923.

XUM

CHRONIC MYOCARDIAL DISEASE*

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London

THE prime importance of the myocardium is emphasized by its relationship to every disorder of the heart and the fact that all diagnostic, prognostic and therapeutic considerations must be based on an intelligent appreciation of the condition of the cardiac musculature, for on its functional capacity are dependent the comfort of the patient, the efficiency of his circulation and the duration of his life under all the vicissitudes which are liable to lead to its impairment Among the varied pernicious influences commonly credited with the ultimate undoing of the dynamic power of the heart I would mention valvular, arterial, and pericardial morbid processes, advanced anaemic and cachetic states and intoxications, the acute infections, nervous stress, and a too ardent worship at the shrines of Bacchus, Venus and Vulcan, while not a small proportion of the individuals are by heredity the unfortunate victims of a defective vital endowment (myocardism). Whatever contributory part these may play, I am disposed to attribute by far the major rôle in the genesis of the myocardial changes to which I am referring to that group of chronic infections associated with the tonsils, teeth, accessory nasal sinuses, etc., which are now the definitely determined etiological agents in the production of various other chronic progressive processes in the joints, kidneys, vessels, and nervous system.

Whichever of these factors, or more frequent association of these factors, may be in operation, the condition of the coronary circulation is the one intrinsic factor which controls the nutrition of the cardiac muscle and determines its ability to adapt itself to usual or unusual demands.

While in a very small minority of instances fibrotic or fatty changes are obvious to the naked eye, in quite the majority the muscle appears normal or yields evidence of degenerative change only to scrutiny through the microscope. In but a few instances is it possible during life to establish a definite relation between the functional activity and the histological condition of the heart muscle, so that the clinical manifestations formerly associated with "fibroid" or "fatty" heart must be attributed to a condition of myocardial inefficiency dependent on degenerate changes other than these.

Numerous efforts have been made to determine some means of definitely estimating the functional capacity of the heart muscle, but so far these have proven far from satisfactory and at best not available for clinical use. Consequently we are dependent for the present on observing the facility with which abnormal subjective sensations or objective signs are produced under the influence of the strain to which each different individual might be subjected in the pursuit of his usual routine and the readiness with which the increased pulse rate is restored to normal and the induced discomfort disappears. This response of the heart to effort is the index of the condition of the myocardium and at the same time, of the patient's limitations. Definite anginal sensations are always significant of heart muscle failure, and no matter how trivial they may appear to the patient, must always be regarded with gravity.

The clinical picture is extremely varied. The subjective symptoms are as a rule most in evidence, the physical signs even in advanced cases being frequently inconspicuous. In by far the greater number of cases there is an insidious development of manifestations which if properly interpreted would lead to an earlier recognition of the serious underlying condition and with the establishment of a proper regimen, the supervention of the more grave sequels might be indefinitely deferred.

The subjects are usually middle-aged or elderly individuals, more commonly men. Some

*Read at the meeting of the Ontario Medical Association, Windsor, June, 1923.

general debility more or less marked precedes or accompanies the symptoms more definitely related to the heart. This is at first only a disability to "come back" at one's work with the usual vigour. For more or less prolonged periods, there may be no further evidence of the myocardial weakening unless some unusual effort is necessitated and then the response to the call is not readily met. A little hurry to catch a car, or some other trifling exertion is followed by an attack of breathlessness, palpitation, retrosternal oppression, giddiness, or faintness, which is not recovered from with normal readiness.

A pallor of vasomotor origin often mistaken for anaemia and a slight general puffiness of the skin best noted after applying the bell of the stethoscope are usually present early.

At this time, or not infrequently at an earlier period, some evidence of the dynamic variation can be obtained by a careful physical examination. The apex beat may be in its normal location or be somewhat, though not usually greatly, displaced to the left. The transverse cardiac area may be normal or but slightly increased. The first sound at the apex may be slightly lacking in muscular tone or its duration or intensity may be diminished. (In examining the heart always demand a normal first sound). Some little increase in frequency of, or an abnormally readily disturbed, pulse rate, with or without notable arrhythmia is often present, while palpation or the sphygmomanometer may show a normal, subnormal, or not infrequently an increased pressure. It is in the use of the sphygmomanometer that one may early demonstrate an inequality of systolic force which may not be appreciable to the finger over the artery or to the ear at the apex. If one carefully palpates the pulse, just as it returns following its obliteration by the cuff, one will note a variation in force of the individual beats, which is not demonstrable with the full volume of the pulse.

A careful investigation of the extreme bases of the lungs also furnishes a valuable sign. Here, if one reverses the usual order of physical examination and carefully auscultates, not the apices but the most dependent thin tongue of lung at the base posteriorly, on a forced inspiration there may be heard a few fine moist râles. To demonstrate them it is necessary to listen carefully with the first full inspiratory excursion, as on full inflation of the lung these râles may disappear and do not reappear for some little time. They are early evidence of the hypostasis and oedema, which later in the course become more prominent features. From an extended observation of these two signs I am convinced of their confirmatory value, when present along with some of the earlier subjective symptoms of which dyspnoea and retrosternal oppression are of prime importance.

It is at this period that the adoption of proper measures may be of value in retarding the aggression for such hearts may on occasion "find themselves." But should our warning pass unheeded and, as not infrequently happens, the patient fails to conform to the new order of things the process pursues its usual relentless march or is expedited by the prosecution of sundry abuses. The trivial dyspnoeic attacks appear at shorter intervals and with less provocation and painful sensations often amounting to true angina are added to the retrosternal oppression. Gradually the terminal phases are evolved. The earlier dyspeptic symptoms become more pronounced, the slight though significant variations of pulse become more definite arrhythmias. Of these bradycardia or tachycardia are noted less often, more frequently fibrillation or pulsus alternans. The increasing dyspnoea necessitates the sitting posture. The respiratory rhythm assumes the Cheyne-Stokes type, the patient becomes cyanosed, restless, irritable, sleep is disturbed and mild delirium supervenes.

Some variable oedema appears in the lower extremities along with more or less effusion in the pleura and peritoneum, but it has been unusual to see such extensive dropsies, as feature so commonly the cases of chronic valvular disease with decompensation. The more protracted the course, the more marked as a rule is the dropsy. In the cases dying suddenly, in more or less apparent health, it is as a rule conspicuously absent.

Hypostatic congestion of the lungs and liver, the latter often accompanied by slight icterus, and passive accumulations in the serous cavities, evidence the progressive failure of the heart. Gallop rhythm supervenes and the patient lapses into unconsciousness and death ends a distressing scene.

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To recapitulate the early features on which to base a diagnosis:

(1) An attack of "acute indigestion" particularly when supervening without apparent provocation, or the occurrence of unusual breathlessness or retrosternal oppression or anginoid attacks following ordinary or moderate effort in a patient at or past mid-life.

(2) Alterations in the character of the first sound of the heart.

(3) Inequality of systolic effort observed earliest and best when employing the sphygmomanometer cuff.

(4) The occurrence of fine moist râles at the extreme base of the lungs posteriorly.

(5) In any cardiac case when conditions indicate the employment of digitalis and its exhibition fails to ameliorate, the suspicion of myocardial disease should arise.

The immediate prospect in any case is always uncertain. In a small percentage in which the disability may be dependent on muscle fag or on a transitory mild infection which may have escaped our recognition, a recovery almost or quite complete may ultimately ensue if requisite care is exercised. At the present I know of no way of definitely distinguishing in the early phases this class of case from those which comprise by far the large majority and whose more or less remote future forbodes disaster. The victims tread a precarious path throughout their course, for at any period life may be abruptly terminated by syncope or an attack of angina or acute oedema of the lungs. On the other hand if recognized early and a proper regimen instituted, life may be prolonged with a moderate measure of comfort and usefulness for some considerable time. The not infrequent association with arterial sclerosis, nephritis, or valvular disease necessarily diversifies the picture and makes the outlook much less hopeful while the gravity of the occurrence of such infections as pneumonia or a bronchitis of even moderate severity is only too frequently brought home to us.

As regards the management I think it is advisable to acquaint the patient with his condition, once we are assured that the changes have been inaugurated, for though we must at present acknowledge in most instances the inefficiency of an attempt to eradicate the process when established, yet with his co-operation much may be done to defer the ultimately disastrous consequences. I shall not take up your time with much detail, but content myself with indicating the lines along which one may expect to obtain this postponement.

(1) The removal of any and all foci of septic infection. This is strongly to be recommended in all instances even though one can advance no evidence that it effects a cure. There is no doubt that the patient is relieved of further deleterious influence from these sources.

(2) The curtailment of the demands on the heart as far as possible is of paramount importance. Undue physical effort, excitement, worry, or nervous strain should be carefully avoided.

(3) The diet should be nutritious and consist principally of proteins with a limitation of bulky foods, fluids, and starches, the liquids on account of their bulk and the increase of the intravascular fluid which they promote, the latter because of the possibility of fermentative distention and consequent cardiac embarassment. Sugar on account of its crystalloid properties is readily absorbable and offers a food for immediate utilization.

(4) Exercise, as walking on the level and on gradients and golfing may be indulged in, but in all instances this must be limited so as not to be productive of breathlessness or fatigue. When active exercise is precluded on account of the ready appearance of dyspnoea, oppression, or actual pain, massage and passive movement may be employed, though in some cases even this is not tolerated.

(5) The maintenance of a free daily evacuation of the bowels is of the utmost importance. Mild laxatives such as phenolphthalein, pill alophen or cascara at night may insure this. The cascara can often be beneficially combined with some hydrochloric acid and nux vomica. An occasional mercurial followed by a saline or castor oil has often a salutary effect.

(6) In many ambulant cases I have found it beneficial to put patients with the less pronounced manifestations to bed for a day or two every week or ten days. Rest in bed is obligatory when breathlessness and retrosternal oppression are more or less continually present or are provoked on the slightest exertion. This is all the more imperative if pain

is produced. Even talking may have to be interdicted.

(7) In considering the employment of remedial agents one naturally turns to those of the "cardiac group" but indications for their use are seldom present. Digitalis is generally admitted to be *facile princeps* in this class, but it is questionable if its utilization here does not in many instances prejudice the already damaged muscle. In the earlier phases I have with very few exceptions, found its employment without any apparent beneficial effect, while in the advanced case I am convinced of its uselessness. I am well aware that digitalis has the unqualified endorsation of good authority, but the improvement following its administration may possibly correspond to a period of amelioration natural to the problem, for remissions and exacerbations more or less pronounced and of variable duration characterize its course. What I have observed with reference to digitalis has been confirmed with other members of the group. Latterly when I have yielded to custom, I have employed strophanthus to the almost exclusion of digitalis because of its more rapidly attained effects and its being less likely to produce gastric disturbance.

From camphor in oil I have never obtained any effect that could not be attributed to the vasomotor reaction to the skinprick of the needle. True when camphor is topically applied to the heart muscle it acts as an irritant, but given subcutaneously it is very doubtful if it has any possible effect as it is immediately converted into inert camphglycuronic acid. With quinidine I have had no experience.

The nitrites may be of service in cases with hyperpiesis or where anginal attacks occur. Of these amyl nitrite on account of its ready adminstration, gives the most promise. Potassium iodide may be mentioned as being of more doubtful utility. It can be of service only when a definitely syphilitic process is implicated. As regards the dropsy, I have found the various remedies, (digitalis, diuretin, spartein, theocin, and alkalis) employed under other circumstances to almost if not entirely fail me. The removal of the serous effusion into the pleurae by the aspirator affords but a slight and transitory amelioration of the respiratory distress.

Against the inefficacy of the drugs mentioned I would place the beneficent effects of carefully controlled doses of morphine, always having in view the fact that with its continued employment the effect tends to wane. The relief which comes with its occasional use in small doses in the early stages from the attacks of restlessness, sleeplessness, respiratory distress, and angina can be obtained from no other agent. After a night's rest under its influence the pulse is found improved and the patient feels very much better. Sulphonal, chloral and other members of the "hypnotic group" which are recommended for insomnia while of value in the earlier phases, in my experience seldom produce the desired result in the advanced problem. In the terminal phases of the condition there is a still more notable absence of response to either rest or drugs, and the care of a competent nurse and the free use of morphia comprise the sum total of the therapeutic measures at our command.

Surgery of the Appendix.—The high operative mortality in cases of acute appendicitis, and the post-operative morbidity in cases of chronic appendicitis, are in the opinion of William E. Lower and Thomas E. Jones, Cleveland, due in large measure to the common belief that in each case the only proper procedure is the removal of the appendix. When the patient with acute appendicitis comes to operation, the removal of the appendix alone does not correct the danger already done by the attendant peritonitis, and there should be a more general appreciation on the part both of the laity and of the profession that acute appendicitis with attendant peritonitis is not a localized but a systemic disease, to which the appropriate after treatment as well as appropriate operative procedures themselves must be applied. The morbidity after operations for chronic appendicitis in the majority of cases is due to incorrect diagnosis. Correct diagnosis in cases of supposedly chronic appendicitis and the proper handling of the acute case will lower the mortality rate of the latter condition and the morbidity rate of the former. —*Jour. A. M. A.*, Aug. 25, 1923.

XUM

THE ORIGIN OF AMMONIA IN THE URINE*

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Montreal

THE object of this communication is to present data confirming, clinically, the view recently put forward of the origin of urinary ammonia from the renal epithelium. The results obtained appear to be of more than abstract interest to the clinician. Not only must an additional interpretation be applied to, but a greater value is found in the results obtained by, a common laboratory test of clinical importance. This applies especially in the study of diabetes mellitus and the various forms of nephritis.

Briefly, the generally accepted view of ammonia formation and excretion is that the ammonia originates from the amino group of amino acids during the intermediary metabolism of the latter. The greater part of the ammonia thus formed combines with carbonic acid forming ammonium carbonate, the lesser part with other available acid radicals. The ammonium carbonate is further converted into urea. When an excess of acid is present in the body owing either to retention of normally formed acids as in renal lesions, or to a production of new acids as in diabetes, the ammonia unites with these rather than with the carbonic acid. Under these conditions less ammonium carbonate is formed and therefore less urea, and thus an amount of ammonia greater than the normal is found in the urine. Because of this phenomenon and the simplicity with which the estimation of urinary ammonia is performed, its estimation in diabetes is more practical in giving an approximately quantitative idea of acid production in the body than any other test. Though the amount of ammonia excreted *per diem* by a normal individual is less than one gram, in diabetes as much as five grams are frequently noted and eight to ten grams have been recorded.

The value of the estimation of the daily excretion of ammonia in a diabetic becomes enhanced, when comparison is made of the results obtained by this and other tests in common use. As a daily routine in the study of the metabolism of diabetics in this hospital the determination of the total acetone bodies in the urine, a time consuming procedure, has been replaced for practical purposes by the titration of the total organic acids (Van Slyke and Palmer).[1] The parallelism between the results of both methods was first demonstrated by the authors of the test and almost invariably noted in further clinical studies.[2] Because of the relative simplicity and rapidity with which the total acid content of urine (cc. N/10 acid + NH_3) could approximately be determined, this has also formed part of the daily routine tests. In the absence of bicarbonate administration, the parallelism between this test and total organic acids is striking. The value of ammonia determinations is thus greatly enhanced. To this there is an exception—diabetes associated with a renal lesion. During the observations in such cases it was occasionally noted that, although much acid was excreted, unexpectedly small quantities of ammonia were found. Determining the amount of ammonia by itself in these instances did not appear to have much clinical value as an index of the severity of the acidosis. Henderson and Palmer[3] first pointed out that in some forms of nephritis the total cubic centimetres of acid plus ammonia may be diminished, and in a statistical sense the intensity of the acidity of the urine in all forms was increased owing chiefly to a decrease in the excretion of ammonia. The mean value of the pH in cardio-renal disease was 5.33 as compared with a pH of 6.00 for normal urine. In such instances a condition of acidosis may be accompanied by a diminished excretion of ammonia. In view of recent experimentation this phenomenon is more readily appreciated.

In 1921 Nash and Benedict[4] first demonstrated the possibility that the ammonia found in the

*From the Department of Metabolism, Montreal General Hospital.

urine has its origin in the kidney. This phenomenon, if operative, explains more readily as pointed out by these authors, the depletion of the alkali reserve in the body under certain conditions. If the efficiency of the kidney becomes impaired, the formation of ammonia is diminished or if it does not keep pace with the rate of an excessive acid production other fixed bases in the body must be called upon in the regulation of the body neutrality. In nephritis it explains the increase in the intensity of the urinary acidity and renews interest in the study of urinary acidity in the estimation of renal efficiency. In a diabetic acidosis associated with nephritis it explains the finding, recorded above, of a marked excretion of acid bodies and an unexpectedly small quantity of ammonia. In diabetes associated with nephritis, the unreliability of urinary ammonia as an index of the severity of the acidosis present is apparent. However, if the explanation of this phenomenon really be defective function of the kidney in the formation of ammonia the estimation of urinary ammonia in cases of diabetes with nephritis not only does not lose its value as formerly regarded, but its clinical importance is enhanced. The ammonia may under these circumstances be no index as to the degree of acid production, but it becomes an index of impaired renal efficiency. To recognize this insufficiency is most essential in the treatment of such diabetics, since with vulnerable kidneys they are more readily susceptible to an acidosis.

The view that the kidney is the seat of urinary ammonia formation appears to be confirmed by the data obtained and recorded here. Observations were made in cases of diabetes with and without apparent renal lesions (albuminuria, casts, blood, and urine renal efficiency tests). The other daily routine data, blood and urine sugars, etc., are purposely omitted, having no direct bearing on the subject.

Technicical Methods:

Blood:	Urea nitrogen (Van Slyke)
	Creatinine (Folin)
	CO_2 Plasma (Van Slyke)
	NH_3 (Nash and Benedict)
	Total acid soluble phosphorus (Bell and Doisy)
Urine:	NH_3 (Folin)
	Organic acids (Van Slyke and Palmer)

Discussion of results.—From the data recorded in the table, observations are made upon (a) the relation between the actual and calculated ammonia in all cases; (b) the relation between the degree of acidosis and ammonia excretion in diabetes with and without renal lesions, and (c) the relation between the degree of impairment of renal efficiency and ammonia excretion in all cases.

The values obtained for the "calculated" urinary ammonia are based upon the same assumptions as those of Nash and Benedict. Thus (a) the rate of blood flow through the kidneys is 150 cc. per minute per 100 grms. of kidney tissue, (b) the total weight of the kidneys is 300 grms. and therefore (c) the total volume of blood which can possibly pass through the kidneys during 24 hours is 648 litres. If the concentration of ammonia in the blood in normal individuals is approximately 0.1 mgms. per 100 cc. applying the above data, the total amount of blood brought to the kidney *per diem* (648 litres) would account only for 0.648 grms. of ammonia in the urine. Though this corresponds with the average amount of amminia found in the urine of normal individuals it cannot account for the large quantities found in various diseases.

A consideration of the values of the blood ammonia found in these instances and the total volume of blood passing through the kidneys *per diem* shows that not nearly sufficient ammonia can have passed through the kidneys from the blood to account for the total amount found in the urine. It will be noted that in none of the cases of diabetes mellitus free from renal lesions do the actually determined and calculated quantities of urinary ammonia correspond, the actual being as much as eleven times greater than the calculated (Case 9). This discrepancy becomes still greater when the possible sources of error in the technique are considered. Rubber stoppers were employed in the apparatus for the determination of the blood ammonia. An effort was made to prevent as far as possible the absorption of ammonia from the laboratory. The blood ammonia values if they err at all owing to the use of rubber stoppers, do so in the direction which will increase their actual value and thus show less descrepancy than is apparent be-

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		BLOOD					URINE							CLINICAL
		Milligrams per 100 cc				Vol. %					Organic	NH_3		
No.	Hosp. No.	Urea. N.	Creatinine	Acid sol phosphorus	NH_3	CO_2 (plasma)	Albumin	Casts	Acetone	Diacetic acid	Acid cc N/10 per diem	Actual	Calculated	
1	1407/22	189	6.97	19	0.08	31	+++	+++				0.16	0.51	Chronic nephritis
		270	6.98		trace	29								pre uraemia
		266	6.66		0.03	24	+++	+++				0.11	0.19	
2	2020	70	3.0											Bichloride poisoning
		105	4.1											
		126	4.2	18	0.06	38	+++	+++				0.02	0.38	First specimen in 72 hours
3	2195	63	1.26		0.06	48	+++	+++				0.38	0.38	Chronic nephritis
		105	3.56	26	0.09		+++	++				0.16	0.58	Streptococcus septicaemia
		129	3.00		0.02	39	+++	+++				0.14	0.12	
4	2783	21	1.3		0.12	35	0	0	+++	+++	3080	3.6	0.87	Diabetic severe
5	3470	24	1.1		0.06	29	0	0	++++	++++	2160	2.2	0.38	" "
6	3839	112	10.2		0.10	10	+++	+++	++++	++++	1840	0.41	0.64	Diabetic coma Uraemia (8 hr. urine specimen
7	5381	219	3.6	21	0.04	56						0.29	0.26	Urethral structure
		133	1.76		0.10							0.26	0.64	Acute retention two days
		83	1.85	14	0.07							0.29	0.45	
		57	1.59		0.10								0.64	
		46	1.50	15	0.11							0.41	0.71	
8	5659	36	2.3		0.11	55	++	+	+++	+	2300	2.0	0.71	Diabetes, Chr. nephritis
9	5831	24	1.42		0.07	30	0	0	+++	+++	4050	5.1	0.45	Diabetes precoma
		22			0.11	36	0	0	+++	+++	2945	3.7	0.64	
		23			0.08	32	0	0	+++	+++	4200	4.4	0.51	
		26			0.04	27	0	0	+++	+++	3645	4.7	0.26	
		22			0.07	20	trace	few	+++	+++	3164	4.2	0.45	First evidence of renal lesion
		44	2.38		0.05	19	++	+	+++	+++	3176	2.2	0.32	Died
10	6163	19	1.0		0.10	46	0	0	++++	++++	1500	2.7	0.64	Diabetes severe
					0.05	46	0	0	++	++	2016	2.3	0.32	
					0.08	48	0	0	+	+	1260	1.8	0.51	
11	6421	50	2.3		0.09	82	++	++	+++	+++	2820	0.58	0.36	Diabetic coma Chr. nephritis (urine 14 hour specimen)
12	916/23	34	1.72		0.06	54	++++	++++				0.15	0.38	Acute nephritis subsiding
		37			0.02		+++	+++				0.29	0.12	
		29			0.06		++	+				0.31	0.38	
		28			0.08		++	+				0.51	0.51	
		29			0.05		+	+				0.46	0.32	

tween the actual and calculated urinary ammonia. In cases 8, 6, and 11 showing diabetes with nephritis and impaired renal efficiency (increased blood urea nitrogen) the marked excretion of organic acids associated with approximately normal urinary ammonias is apparent. In cases 6 and 11 (coma) this is more striking since the urinary ammonia values were obtained from an incomplete 24 hour specimen, but the exact period was noted (urine obtained by catheterization) and calculated on the basis of a 24 hour excretion. The fall in the value of urinary ammonia in case 9, following the onset of a nephritis preceding coma, emphasizes the fact noted above that, although the urinary ammonia in such a case is no index of the degree of acid production, it is an index of vulnerable kidneys and modifies the treatment. In all the cases of nephritis the values of the blood ammonia were within the normal limits, in spite of the possible source of technical error recorded above. Since retention products of metabolism are expected in cases with renal lesions associated with impaired function, this feature again supports the view that the kidney

is the site of formation of urinary ammonia. Since there was no other apparent factor to account for the low urinary ammonia values found in all forms of nephritis recorded, bicarbonate administration, diet, etc., it appears that such values can only be explained on the basis of renal inefficiency.

Conclusions.—Data have been obtained clinically which support the view recently put forward that one function of the kidney is to form ammonia.

Grateful acknowledgement is due Miss Althea Frith for technical assistance.

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IDIOPATHIC MENORRHAGIA AND X-RAY THERAPY*

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THE subject of uterine haemorrhage and x-ray therapy is no longer in its infancy, having been introduced by the French sometime about 1904. Since then it has steadily gained ground until now it is a well recognized procedure having a firm physiological and scientific basis.

The material for this paper is drawn from one hundred haemorrhagic cases, and on classifying them it is found that they can be divided into two main groups as follows:

A.—1. Idiopathic haemorrhage occurring at puberty, the menopause, and during the child bearing period. These cases showed no gross pathological uterine condition. 2. Haemorrhage occurring *in utero* which could be classified as subinvoluted, uteri fibrosi, etc., but showed no evidence of growth benign or malignant.

B.—Haemorrhage associated with fibromata. Haemorrhage arising from such conditions as ulceration, polypi, malignant growths, etc. do not belong to the domain of this paper. Those associated with inflammatory conditions and retroversion will be referred to later.

The majority belonging to class "A" most commonly are referred for treatment sometime between the ages of thirty-five and fifty-five. Cases near the menopause predominate, those at puberty form a small minority. In this class, particularly among the older patients, it was formerly thought that the bleeding was due to some abnormality of the uterine wall, that either an increase of connective tissue or change in the arteries was present; such an explanation cannot be true because uteri removed for causes other than haemorrhage and not suffering from haemorrhage show changes in the myometrium and blood vessels, even more pronounced than cases suffering from menorrhagia. A common finding in haemorrhagic cases in either normal or fibrosed uteri, etc., is the swollen and proliferated endometrium. This condition was found by W. A. Scott in 64 out of 92 bleeding cases. For years there seems to have been a great deal of confusion concerning the exact cause of this haemorrhage until Hitschmann and Adler in 1908 and later Novak in 1917, announced the result of their work which clearly demonstrated that the cause of this haemorrhage lay without the uterus. They pointed out that the endometrium resembled the normal pre-menstrual change and that it was a perverted physiological condition. We know that the Graafian and primary follicles are intimately connected with the menstrual phonemena. Recent experiments clearly demonstrate that the corpus

*Read before the Section of Obstetrics and Gynaecology, Academy of Medicine, Toronto, March 1, 1923.

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luteum contains some substance acting on the endometrium thereby controlling the menstrual cycle. Clinically it is surprising to find the frequency with which abnormalities of the corpus luteum are found in these haemorrhagic cases. While the corpus luteum is undoubtedly a most important controlling factor, yet as pointed out by Scott these idiopathic haemorrhages do occur at the time when the endocrine activity is liable to be abnormal, and from our experience we believe that they often play a most important part. Fortunately the x-ray controls both conditions through its action on the ovaries.

Class "B" or those in which haemorrhage and fibroma are coexistent offer an added problem. The connection between the two is still under discussion. It would appear that there is some casual relation between the fibroma and the bleeding. The endometrium presents the same microscopic picture as in class "A" and when radiation is applied the bleeding readily subsides. The growth presents no added difficulty to the control of the haemorrhage. Just how the ray affects the fibroid is still under discussion. The French believe that it is brought about by direct action on the fibroid. Béclère has shown that from the first week after exposure 1cm. of shrinkage occurs and that this rate is maintained until disappearance. This reduction commences long before there is any appreciable change in the menstrual history. The Germans on the other hand believe it is brought about through the action of the ray on the ovary. Our experience would lead us to believe that the French theory is the more likely one as cases in which the ovaries are shielded have shown a marked reduction and disappearance of the fibroma. Whatever the action, there is no question that the fibroids do disappear under radiation therapy; even the larger growths show remarkable diminution.

Turning to the biological reaction of the tissues to the ray, we find that very careful experimental work was done by Halberstadter on animals as early as 1905. He exposed the female generative tract of a rabbit and noted that grossly the ovaries became smaller but showed no change in the primordial collicles or corpus luteum. These experiments were repeated by others, who by altering the exposure and increasing the subsequent time before conducting a post mortem, demonstrated that the primary follicles were definitely destroyed. On comparing these changes with the human radiated ovary, it has been repeatedly shown that the results are quite comparable. One case examined eighteen days after radiation showed gross evidence of haemorrhage on its surface; on section the primary follicles were undergoing degeneration.

Owing to more precise methods of measurement, we can now determine the exact amount of ray necessary to produce these effects in a given ovary, and from careful clinical and histological study we know that the action of the ray is not limited to one or two days but is continuous over a period of time which according to the dose may take months before its completion. As experience and experiments both point to the Graafian follicle as governing the normal and pathological menstrual cycle, and as these idiopathic haemorrhagic conditions largely depend on some abnormality in the life cycle of the primary follicle and corpus luteum, the x-ray is a very potent factor in curing these cases, especially so as the primary follicles are extremely susceptible to radiation.

Through recent developments in x-ray therapy there has arisen the question of giving a massive single dose by using a high voltage. This in itself has many favourable points but in actual practice it is not uniformly successful, which, in view of the severity of the treatment is very disappointing, especially as satisfactory results can be obtained by using lower voltage and smaller doses repeated after a few weeks' interval. This latter method has the added advantages of simulating more closely the normal menopause; it is not blood destroying nor does it produce the severe radiation sickness.

Considering the idiopathic haemorrhage occurring just at puberty or slightly after its onset one is loath to advise radiation therapy direct to the ovary lest the periods cease, yet the bleeding may become so severe and having resisted minor operative and local treatment the question of hysterectomy may arise, in which case case radiation therapy should first be tried by using a partial dose, hoping to subdue rather than to destroy the primary follicle. One must be careful not to promise that menstruation will not cease. A partial dose may

cause cessation. That even this is justified there can be no doubt, as it saves the patient from the dangers of a major operation, besides there is always the chance that menstruation may return and with it the possibility of normal pregnancy.

There is a small group of patients at this period who are evidently suffering from some disturbance of the endocrines acting upon the ovaries and uterus; these cases suffering from profuse bleeding often show a coexistent enlargement of the thyroid, and some may even show mild symptoms of hyperthyroidism. Our experience would lead us to suggest that the thyroid be first treated. That there is a definite connection is well illustrated by the following case.

Girl, age 17, Canadian, unmarried, living at home under good hygienic conditions. *Family history.*—Negative. *Previous illnesses.*—Measles at five, diphtheria at fourteen years, bronchitis every winter. *Menstrual history.*—Periods commenced at 14; irregular for first year and a half, then became regular for one year, occurring every four weeks, lasting seven days with no more than the usual discomfort. At age 10 a goitre developed which has persisted, and at 16 the mother noticed it becoming larger; the patient became nervous and would tire easily. Shortly afterwards the periods became irregular until now they occur every ten days and last seven. A great deal of blood is lost, so much so that the mother notices patient is becoming anaemic (60% Hbg.) *Physical examination.*—Showed no abnormality in the female organs. The patient showed enlargement of the thyroid, slight tremor, sweating of the hands and increase in pulse rate.

Three courses of x-ray treatment were administered over the thyroid. Following the first the patient felt better; the menstrual flow did not occur for three weeks and was less in amount. Following the second and third course the periods arrived every four weeks and lasted two days. The goitre symptoms also disappeared; the enlargement in the neck lessened but persisted. This patient was examined two years later, during which time her menses had remained normal. They now occur regularly every four weeks and last four to five days.

Cases which occur during the child-bearing period are a more difficult problem. Naturally one does not wish to produce sterility if it can be avoided. For that reason uterine curettement should first be tried; if this does not cure then only two sources remain, viz., hysterectomy or radiation. The latter is undoubtedly the rational course as very frequently by giving a partial dose, one can temporarily depress the primordial follicles and so produce a temporary amenorrhea, but as in the younger class the prognosis must be guarded lest a partial dose prove a full dose for that patient. If the menorrhagia cannot be controlled by a partial dose then there is no alternative but to produce a permanent amenorrhea, which is easily accomplished and is vastly preferable to hysterectomy.

The treatment of cases at or near the menopause is a much simpler matter. Having shown it to be a perverted menstrual flow the treatment resolves itself into the destruction of the primary follicles, which is done so completely and easily that usually not more than two treatments are required. The ease with which this can be accomplished is in no small way due to the nearness of the natural menopause. The patient herself is more than grateful to be freed from a life so debilitating and confining.

Those haemorrhagic cases which are associated with fibromata present a double problem, depending on whether the haemorrhage is to be relieved or the fibroid to be reduced. If the bleeding be the predominating symptom then radiation is the method of choice.

The same problem will be met with in connection with the menopause as in the former group, as there is often some connection between the fibroid and the bleeding, and we know that a fibroid can be reduced by direct action of the ray. In the child-bearing period the ovaries can be shielded and the ray directed only upon the uterus, but if the bleeding should be caused by some ovarian abnormality, then the ovaries should be treated as in the former group.

Should the question of surgical interference be raised, especially during the child-bearing period, it must be remembered that bleeding does recur after excision of the fibroid. If, however, complete removal of the uterus is decided upon, it naturally eliminates any pos-

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sibility of future pregnancy. Radiation therapy at this period ought, therefore, to be given a fair trial; it offers relief without completely removing the possibility of motherhood. If, on the other hand, the patient is just at or near the menopause, both the ovaries and uterus can be rayed without any hesitation and with success. While the treatment of fibroids does not fall within the domain of this paper unless associated with haemorrhage, yet in passing, it is worthy of mention that if pressure symptoms are present, we have a different problem and one which often demands a nicety of judgment. If the symptoms are urgent and are causing mechanical difficulties, then I believe that operation is indicated, provided of course, that the patient is a good operative risk. Yet if ample time be given, it must be remembered that shrinkage and complete disappearance can be obtained by radiation therapy. The latter method has the advantage in that it does not entail any danger and is less costly to the patient.

Since x-ray therapy has become so popular one often hears of the danger of the fibroid undergoing sarcomatous transformation, some surgeons and gynaecologists asserting it to be a common occurrence. It would appear, however, that as yet they cannot distinguish between the rapidly growing early muscular or connective tissue cell, and until some method is devised this point will always be in doubt. Such well known pathologists as Ewing and Bland Sutton both state it to be a very rare occurrence. Ewing after twenty years experience has only met with three cases undergoing sarcomatous transformation and showing metastases. It would, therefore, appear that such an assertion is more theory than fact. Lest, however, the bleeding should mask an early malignancy, either carcinoma or sarcoma, it is always advisable that a diagnostic curettage be performed, a procedure practised in many clinics previous to hysterectomy.

The bleeding associated with pelvic inflammation is still somewhat obscure and should be treated according to the cause.

When retroversion is associated with menorrhagia and giving rise to symptoms, it is advisable to replace the uterus by non-operative means and observe the effect before advising radiation, but if there are no symptoms due to the retroversion and especially if the patient is near the menopause, radiation will relieve the menorrhagia and should be prescribed irrespective of the displacement.

In all these types the radiologist must remember that he is dealing with a human being and one who is suffering from a debilitating condition. Proper co-operation with the attending physician should exist in order that the patient as well as her bleeding may be treated.

The results obtained to date in these cases of idiopathic menorrhagia are excellent; they have shown no return of the bleeding. Their ages ranged from 35 to 55. Excluding the case treated over the thyroid, in no case was it necessary to give more than two courses.

Those cases associated with fibromata have shown a uniform cessation of bleeding with reduction of the fibroids. Some of the larger ones have not disappeared but are markedly reduced, and are not giving rise to symptoms. The menorrhagia was controlled after the second course. The fibroids required from four to six courses. We also see a shortening of the menopause symptoms. The characteristic hot flushes seem to terminate more quickly than with the normal menstrual change. The artificial menopause does not appear to influence the sexual instincts. Care should be taken that pyschoneurotic patients are not treated lest rather severe mental symptoms are precipitated.

Balancing surgery and radiation therapy in the treatment of these idiopathic haemorrhages, there seems no doubt that the latter is the method of choice. Its application is simple; the patient is not exposed to the risk of operation with its possible sequelae. No surgeon can afford to treat the method with indifference.

THE DIAGNOSIS OF PULMONARY TUBERCULOSIS—THE APPLICATION AND INTERPRETATION OF DIFFERENT TESTS*

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I.—Examination of the sputum for the presence or absence of the tubercle bacillus:—This method still remains one of our most valuable assets, but it is not used in proportion to its importance and limitations. From the laboratory point of view there are three ways in which a test can be made:—(a) Direct smear and staining of the untreated sputum. (b) Initial treatment of the sputum with antiformin or one of the modifications thereof, the purpose of which is to make the sputum homogeneous. (c) Inoculation of guinea pig with treated or untreated sputum.

Those who prefer to search for the bacillus in treated sputum claim only a slightly higher percentage of positive findings. It is questionable whether the time employed in treating the sputum could not with almost equal advantage be spent with two important features of the direct method. These are, (a) the selection for spreading and staining of likely particles of the sample with the avoidance of bits of food or merely mucus, and (b) the time and care spent in searching with the microscope. The third method—that of inoculation—will undoubtedly demonstrate the presence of the bacillus in sputum in which by staining methods it has been impossible to find them. By this method the results will not be obtained before 3–5 weeks. This factor of time is not as important as it would at first sight appear, because the instances in which this method is used should be carefully selected after the thorough employment of other means of examination; such cases are likely to need a period of observation following the initial examination, and the results of the inoculation will probably be available when the final revision of the case is made.

The demonstration of the bacillus gives a stability and chronological permanency to the diagnosis; but beyond this its importance in that assemblage of data upon which the clinical judgment of the case should rest is in comparison small. The reported absence of the bacillus by itself means nothing; repeated failures begin to have a very considerable diagnostic value, especially if this information is correlated with certain features of the individual case. For example, in a case in which the physical signs are definite, and in which the sputum is considerable in amount, purulent or muco-purulent in character, the repeated absence of the bacillus is of much greater exclusive value than it is in cases in which these features are absent.

There are three chief points which would warrant repetition, they are:—1.—Based upon the prevalence of pulmonary tuberculosis the profession does not utilize this test in proportion to its importance. 2.—One or two negative results are of little value, and do not justify the exclusion of tuberculosis in cases in which on other grounds one may be suspicious of this disease. 3.—Repeated negative results with different samples, however, become of increasing exclusive value in proportion to the number of such and when considered in correlation with certain of the clinical features of the individual case.

II.—The albumin reaction in sputum[1]:—. Equal parts of sputum and of a 3% acetic acid solution are mixed, allowed to stand for a few moments, and then filtered. The clear filtrate is tested for albumin by Esbach's method as employed in urinalysis. The chief value of the test lies in its simplicity. While it is positive in a high percentage of well advanced cases, it is likely to be absent in those cases of minimal involvement presenting difficulties of diagnosis. It may also be present in other pulmonary in-

*(Being part of a symposium on pulmonary tuberculosis presented by the Laennec Society, at the annual meeting of the Ontario Medical Society, Niagara Falls, May, 1921.)

fections such as bronchiectasis, pulmonary abscess, broncho-pneumonia, etc.

III.—Goetsch test[2]:—The purpose of the test is to detect disturbed thyroid metabolism or hyperthyroidism; it is based upon the assumption that the condition of constitutional hypersensitiveness of the sympathetic nervous system, such as is associated with hyperthyroidism, can be demonstrated by the injection of adrenalin. It is thus applicable to those cases in which, although we are unable to demonstrate a positive tuberculous lesion by physical methods or the x-ray, we are nevertheless led to suspect that subminimal involvement may be the cause of the syndrome of poor work tolerance, easily produced fatigue, loss of energy, loss of weight, slight elevation of temperature, together with vasomotor disturbances. In addition the test can logically be used for those in whom we can demonstrate a probable or positive lesion which, however, on other grounds we believe to be non-operative, and clinically not the cause of the constitutional signs and symptoms enumerated above.

It should be mentioned here that basal metabolism determinations[3] will serve the same purpose and do so with greater accuracy. A negative Goetsch test and the demonstration of a normal basal metabolism rules out hyperthyroidism, and emphasizes the likelihood of a focal infection, which may, however, be either tuberculous or non-tuberculous in character. The demonstration of increased basal metabolism is indicative of the presence of hyperthyroidism, and thus responsible wholly or in part, for the clinical condition. To a less exact degree the same suggestion is afforded by a positive Goetsch test.

The Goetsch test consists of the subcutaneous injection of about 0.5 cc. adrenalin after the patient has been kept at rest and is in as undisturbing surroundings as possible. With a positive result there is usually an early rise in blood pressure and pulse of at least ten points; in the course of 30-35 minutes there is a moderate fall, then a slight secondary rise which is succeeded by a secondary fall to normal in 1-1½ hours. Readings of blood pressure and the pulse should be taken from every 2½ minutes at the start to every ten minutes later. Attention should be paid to any accentuation of the symptoms referable to thyroidism obtained during the test, and compared with the findings previous to the injection.

IV.—The tuberculin test in adults is a method of demonstrating the degree of specific sensitiveness to tuberculin. This is not a clinical condition; it is an immunological state which it is believed can only be produced by the entrance or implantation of the tubercle bacillus, and the production by the invading microbe of a microscopic or gross lesion within the host.

The presence of this specific sensitiveness, that is, a positive reaction or test, means only that these events have taken place sometime in the past life of the individual; it gives no indication whether the resulting lesion is microscopic or gross, whether the bacilli have been killed, whether they are still alive though walled-off and non-active, or whether they are propagating and increasing the pathological involvement. It thus bears in the adult no correlation to the disease we call clinical tuberculosis. Despite this absence of diagnostic value it continues to be extensively employed, in connection with which the following points remain for consideration.

(A) Excluding the frankly and dangerously ill, does the absence of tuberculin sensitiveness, *i.e.* repeated negative tests, exclude tuberculosis? The answer is in the negative, although the combination of clinical tuberculosis of the type inferred and negative tuberculin sensitiveness is no doubt comparatively rare.

(B) Is the degree of reaction or sensitiveness indicative of the degree of specific resistance, or otherwise expressed, is the result of the test of prognostic value? Here again the answer is in the negative, although in this connection one may perhaps add that many tuberculous patients, who do well or achieve an apparent or real cure, provide striking examples of both very marked and very slight, or doubtful reactions, *i.e.* marked and minimal degrees of sensitiveness.

(C) If the test is used quantitively and it is found that a marked difference in the degree of sensitiveness is obtained after the lapse of a month or so, it is at least to be regarded with considerable suspicion. With this method there are, however, many pitfalls, and all sources of error should be excluded as much as possible.

The test can be made in different ways:—

(a) It can be performed cutaneously by which is meant that the degree of sensitiveness is judged by the extent of the local reaction, *i.e.* infiltration, hyperaemia, lymphangitis, and vesicle formation. By this method a general reaction will be induced with comparative rarity and it will not be severe. Either the intracutaneous method of Mantoux or the percutaneous method of v. Pirquet may be employed. The former method is less painful and lends itself to greater quantitative accuracy. 1/20 mg. of O. T. in 0.02 cc. is a very satisfactory dosage to employ, (i.e. 0.02 cc. of a 1/400 dilution of O. T.). It is not sufficiently strong to induce extreme reaction except rarely, and not too weak to miss slight degrees of sensitiveness. This intracutaneous dose quantitatively corresponds to a 10 emm. amount of a 50% solution of O. T. by the v. Pirquet method.

The Wolff-Eisner-Calmette installation into the eye is to be condemned as too dangerous, and the ointment of Moro as inaccurate.

(b) The subcutaneous method. It is illogical to use this method unless one believes in the value of focal signs, *i.e.* those adventitious sounds heard over some area of the chest during the general reaction and interpreted as an activation in or about a tuberculous lesion. The effects of the subcutaneous injection are local, general, and focal. The present conception necessitates a general reaction, *i.e.* malaise and fever, before a focal reaction, *i.e.* in the area of disease, can be induced. The dosage necessary to cause a general reaction varies extremely with different individuals but can be gauged roughly by the degree of sensitiveness as shown by the intra- or per-cutaneous method.

V.—The auto-urine and auto-serum test[4]: The theory underlying this procedure is that any case with an active focus produces a tuberculin or a substance acting in a fashion identical with tuberculin. This tuberculin-like antigen is present in the serum and the urine of the individual during the time that his focus is active, and can be demonstrated by injecting intracutaneously properly prepared urine or serum into the patient's own arm; or in case he is not tuberculin sensitive (*i.e.*, is anergic), by injection into the skin of an allergic (*i.e.* tuberculin sensitive) case.

We know that a high percentage of normals and apparently non-tuberculous cases have tuberculous lesions which, however, can not be demonstrated. If this test when positive is truly dependent upon the conceptions upon which it is based, we must expect to get positive results occasionally in cases in which we can, for the moment at least, find no clinical confirmation. This is on the assumption that amongst all the individuals with lesions there must be a time when, so to speak, activity is beginning or ending. Continuous observation and repetition of the test must in such cases be relied upon as our guide as to treatment.

The reaction produced by tuberculin (intracutaneously) indicates a tuberculin sensitization as outlined in the preceding section. The reaction produced by injecting urine or serum into the case, which we already know is tuberculin sensitive, is taken to indicate that the individual (whose urine or serum was used) has an active focus owing to the assumption that the reaction was induced by tuberculin being present in the injected urine or serum.

VI.—Tuberculo-complement fixation: This is an adaptation to tuberculosis of Bordet's reaction of complement fixation. It has received increasing attention of late years. The value which has been attributed to it by different serologists and clinicians has varied extremely, a discussion of this is, however, beyond the scope of this short summary. The several features which seem of clinical importance might be grouped as follows: All types of proved clinical tuberculosis do not give positive tests. If a number of cases are followed for a considerable period of time it is found that in certain cases the test appears apparently for the first time during those stages which are to be regarded as in or approaching the classification of apparent arrest.

In contrast with this it is positive in a very high percentage of the cases which are frankly, even dangerously active. On account of the high percentage of positive results in this class of case a poor work tolerance value is suspected in those who give a strongly positive result. This would be a marked feature were it not for the many cases in which exactly the opposite result is obtained—although the test is usually not so strongly positive in these apparently arrested types.

In clinical normals from 10-30% give a

positive test—depending upon the source of the investigated material and the degree of end reaction which the particular laboratory will call positive.

Considered diagnostically, the positive test may be said to have about the same value in adults which the positive tuberculin test has in early childhood. As such it takes its place in the data upon which one bases one's final diagnosis.

VII.—The two remaining serological tests are the inhibiteur reaction of Calmette and the inhibitive reaction of Caulfeild. So far no independent investigator has reported his results with either test and on that basis both are to be regarded as in the experimental stage. The technique of each is different and would appear to rest upon fundamentally different factors*

Conclusions:—The examination of the sputum is a very simple procedure and can easily be carried out by the physician in his own office, or advantage can be taken of the different provincial or municipal health laboratories, which will supply bottles and containers ready for mailing, and report the result without charge. Likewise the test for albumin can be made by the physician in his own office.

The Goetsch test is easily made by the physician in the patient's home. The basal metabolism determinations require some apparatus and considerable experience for accurate results. Tuberculin tests can be harmful if given subcutaneously; the other methods are without this danger but any practical interpretation from the results should be attempted only by those who have had experience with the method and who are familiar with methods of diluting for exact dosage. The serological tests while very promising, must be done in thoroughly equipped laboratories in charge of experienced serologists. Practical interpretations are not advisable unless one has had a very considerable experience with a large number of cases on which both repeated tests and clinical observations have been made.

*For details and summary of value of the serological tests, see Caulfeild, *Can. Med. Ass. Jour*, 1922, XII, 650.

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Case Report

QUARTAN MALARIA

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The clinic of the spring, 1923, produced an unusual number of Chinese patients reporting with quartan malaria. This type is comparatively rare with us, but occurring out of the mosquito season when very few patients report at all with malaria, it was the more unusual. There are certain features of this type of malaria, which have interested us, and which are in contrast to the tertian forms, either benign or malignant.

I.—*The Paroxysm.* The history given was invariably one with a two-day interval between the paroxysms, as the initial condition, but as time went by—say a month without treatment—the interval usually was one of a day only followed by two successive days on which paroxysms occurred; occasionally the fever assumed the quotidian type and a paroxysm occurred daily. Frequently after a second month elapsed the paroxysms would revert to the initial form and occur with a two-day interval.

The patient's statements regarding his condition do not always correspond with the blood findings, for a patient who states that he only has a paroxysm every fourth day, will show in

the blood parasites in two different stages of development which should have given a paroxysm on two successive days. A patient who thus reported and who came on his "off" day would sometimes be found to have a temperature of 102 or 103, with sporulating forms of the parasites in the red corpuscles. Apparently the paroxysm may become so slight the patient may ignore it entirely, while the subsequent or alternate paroxysm may produce unmistakeable symptoms.

One patient developed a chill when in the outdoor, and had a temperature of over 104; the patient, however, did not exhibit great distress and insisted on returning home some miles the same day. The condition during the paroxysm is nothing like what is seen during a benign tertian chill, where the patient is prostrated and entirely overcome.

II.—*The Chronicity.* Although most of our patients had suffered for six and even nine months, most of them reported that they had usually been able to keep at their daily occupations and few had ever been confined to bed. The disease was not considered to be of sufficient import to come for treatment when the attacks first occurred; it was only when they got tired of not getting better that they eventually came for treatment.

One does not see in these quartan cases, the anaemia that so soon characterizes the benign tertian, nor the cachexia that eventually marks the sub-tertian. The spleen has never shown marked enlargement, anasarca was not present in any of these patients. It is truly a benign type, persistent but not severe.

III.—*The Parasite.* The ring forms are larger than the benign tertian which in turn are larger than the sub-tertian, show more of the blue staining protoplasm with Romanowsky stain and a larger mass of chromatin. The half grown have always been round, oval or sausage-shaped, while the matured parasite is always round and completely fills the enclosing red cell. The regular outline of the quartan parasite is in marked contrast to the parasite of the benign tertian, where irregularity seems the rule and no two parasites assume the same shape. The pigment is much more plentiful and coarser than in the tertian, while the enclosing corpuscle does not show perceptible enlargement even when the parasite attains its full growth, nor does it assume the irregular outline so constantly seen with enlargement when the parasite of benign tertian inhabits the corpuscle.

In no case have we seen a mixed quartan and tertian infection.

IV.—*Treatment.* Quinine of course will give early relief, but to effect a cure treatment must be prolonged. The statement that "it is useless to look for a parasite in the blood after the patient has had quinine for twenty-four hours" is not true as regards quartan infection, any more than it is true of the crescent forms of the sub-tertian, we have seen it after many days of treatment.

By far the most effective method of quinine administration that we have tried is the intravenous injection of the hydrochloride, ten grains to the dose, repeated daily for three to five days when treatment by mouth may be resorted to. Quinine should be continued until four drachms, more or less, have been administered, according to the time and virulence of the infection. Iron and arsenic are useful as supplementary to the quinine.

The intravenous route we have found to be much more satisfactory than the intra-muscular, no local necrosis follows the administration, nor other local disturbance. The effect is almost instantaneous and a feeling of faintness or nausea may ensue; the patient should be kept in a recumbent position for at least half an hour after administration. Larger doses than ten grains may cause too great a reaction, and vomiting and prostration have followed the injection of fifteen grains.

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Editorial

CANADIAN PHYSIOLOGISTS AT BRITISH CONVENTIONS

CANADA may well be proud of the position which representatives of her scientific research were given both at the International Physiological Congress in Edinburgh, and in the Section of Medicine at the annual meeting of the British Medical Association at Portsmouth. At the Physiological Congress the members who, as the *British Medical Journal* states, are more accustomed to lecture than to listen to lectures, did Professor Macleod of Toronto, the honour to give up the first session entirely to his story of the early attempts to obtain the hormone of the pancreas, and to a modest presentation of how Dr. Banting and collaborators in his laboratory finally succeeded in obtaining it. He described how Dr. Banting had taken advantage of the old observation that obstruction of the ducts of the pancreas was followed by degeneration of the cells of the acini by which the pancreatic juice is secreted, while the islets of Langerhans remained little affected. Physiologists had long been confident that the pancreas did produce a hormone; the difficulty was in obtaining it, for when an extract of the whole pancreas was made the hormone was destroyed by the trypsin-producing cells. It was to the enduring credit of Banting that by experiments of a different type from those of his predecessors he first obtained evidence of its existence and finally was able to obtain it in a comparatively pure state.

It was also to the credit of the Toronto experimenters that they unravelled the meaning of the convulsions which occur after the injection of insulin in an animal rendered diabetic by excision of the pancreas. These observers proved that the convulsions were not the result of the insulin itself, but were produced by a consequent deficiency of sugar in the blood and could be arrested by the injection of glucose.

At the meeting of the British Medical Association held in Portsmouth, the Section of Medicine also devoted a morning to a discussion of the effects of insulin, and its President, Sir Thomas Horder, after emphasizing the great value of the discovery asked the question whether it was likely that it will ever become possible to administer insulin by the mouth. From our present knowledge it appears that this is never likely to be a possibility. It was the destruction of the hormone by the trypsin secreted by the gland, that stood in the way of the earlier experimenters, and it is now known that insulin is also destroyed by pepsin. Another question asked by Sir Thomas Horder was whether there is any hope of the recovery of the islets of Langerhans in diabetics. While nothing definite can be yet said on this point, Professor Macleod mentioned the observation that islet tissue develops considerable powers of regeneration after much of it has been destroyed as a result of ligation of the secreting ducts of the gland; and in the course of the discussion, Dr. Poulton also made the statement that he had observed increased toleration of starches in three out of four mild cases. Dr. Banting's presentation of his own story was given very clearly and modestly, in an excellent voice audible all through the crowded hall, and was listened to with the greatest attention. The profession in Canada desire to ac-

knowledge these characteristics in Professor Banting's address, and to congratulate him on the appreciation shown not only by the profession in England, but also by the King, of the great value to the world of the results obtained by his thoughtful and energetically pursued research, and on the announcement of his methods without any attempt to secure personal profit.

THE EFFECTS OF LIGHT ON THE BODY

THE action of sunlight on the surface of the body has been recognized for years; sunburn and snow-blindness are so well known that they require no comment. That light can produce any remote or general effect, however, has not been so fully realized, and it is only recently that this subject has received any clinical attention.

The study of light in its relation to life dates from the time of Downes and Blount, who before the Royal Society in 1877, reported that exposure to light retarded the growth of bacteria. Finsen in 1896 first directed general attention to the use of intense light in the treatment of diseases of the skin, notably those of tuberculous origin, and seven years later Rollier in the Alps began his studies of heliotherapy in the more generalized or systematic forms of tuberculosis. Recently his results have been published in book form, and have drawn attention to the remarkable effects of light upon the general metabolism of the body. In 1919 Huldschinsky[1] reported the cure of rickets by the ultraviolet ray. Following repeated exposure he was able to demonstrate by X-ray, increased deposits of lime salts at the ends of the long bones, and all symptoms of the disease disappeared within two months. Park, Howland, Hess and other observers have confirmed these findings and have added to the information regarding the exact chemical nature of these changes in the phosphorus and calcium metabolism which follow the use of ultraviolet light in the treatment of rickets.

Light varies in its effects according to the amount of actinic rays which it contains. Those who have had experience in photography will remember that the intensity of the image in the photograph varies tremendously according to the amount of actinic light present, that is the amount of light farthest removed from the red-orange end of the spectrum. Much of this light is invisible to the eye as its wave-length is too short to produce the light stimulation of the retina, just as in the study of sound certain notes have such a high frequency of vibration that they are inaudible to the human ear. These invisible ultraviolet rays have very visible effects on the skin, notably erythema and even blistering which follow relatively short exposures, be it to intense sunlight or to the light from one of the quartz mercury lamps.

Ultraviolet light also produces great changes in the circulation of certain organs. In experimental animals it causes a marked engorgement of the spleen, lungs, and liver, the spleen often being enlarged to twice or thrice its normal size. Other changes in the circulation and the metabolism have also been noted, and it becomes evident as Clark[2] says that the absorption of ultraviolet light by the body surface to the depth of only one tenth of a millimeter, results not only in an immediate or direct effect on the skin, but also in a distant effect on certain organs; this can be explained most plausibly by the production of some photochemical substance at the surface which is conveyed

(1) HULDSCHINSKY, K., Heilung von Rachitis durch künstliche Höhensonne, *Deutsche med. Wochenschr*, 1919, Vol. XLV., p. 712.

(2) CLARK, J. H., Physiological Action of Light, *Physiological Rev.*, 1922, Vol. 2, p. 277.

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to the internal organs by way of the blood.

To obtain the full action of ultraviolet light there must be a free passage of the rays from their source to the exposed surface. They have little or no penetrating power and a layer of skin 0.1 mm. thick suffices to absorb the most intense radiation. Many other substances absorb the rays and hinder their passage, for example, ordinary window glass stops a large proportion of the more active rays as evidenced by the lack of effect of sunlight on rachitic children in the ordinary solarium, or more popularly the slowness with which sunburn develops in patients exposed under glass. The ozone of the atmosphere also tends to absorb actinic light and hinder its passage. *Direct exposure is required to ensure satisfactory results in heliotherapy.*

The effects of ultraviolet light vary greatly according to the sensitiveness of each individual, the fair complexion being more affected than the dark, and this may be the explanation of the general trend of the lighter races to survive in the higher latitudes as compared with the greater resistance of the darker peoples under tropical conditions, where there is a greater incidence of ultraviolet light. So also in the animal world the changing colours of the hare and ptarmigan when exposed to the Arctic winter may not be so much a protective mechanism to make the animal less conspicuous, as an effort on the part of nature to make the fullest use of the limited actinic value of the polar light.

Besides the colouring of the individual, certain well known chemical substances have a definite power of increasing the effects of ultraviolet light. So called "buckwheat poisoning" in cattle is most interesting in this regard. Haematoporphyrin, a substance derived from haematin by the removal of iron, plays a startling rôle as a sensitiser to light. One observer with more regard for science than for himself, found after intravenous injection of 200 milligrams (gr. iiiss) of haematoporphyrin that for weeks any exposure to sunlight caused a most alarming reaction characterized by restlessness, vaso-motor disturbances, and dyspnoea while he was quite comfortable when not in the sun. Haematoporphyrin is found in the urine of children in certain conditions, and pediatricians report the rapid formation of bullae if such patients are exposed to light, and also systemic reactions very similar to that described above. This then is an example of naturally occurring haematoporphyrin sensitization.

The bactericidal action of ultraviolet light has recently been made the subject of exact study by Bayne-Jones and Van der Lingen[3] and they find again that the visible rays of the spectrum have little influence on bacterial growth, but that the light with the shorter wave lengths is absorbed by the bacteria and has a very destructive action. This activity is greatly increased by raising the acidity of the media in which the bacteria are exposed.

There can be no doubt that actinic light has a great influence in the metabolism of living matter, but the application of light to the treatment of disease is still in its infancy. Up to the present the chief positive results have had to do with surface effects in diseases of the skin and with the deposition of calcium and phosphorus in the bony framework. In tuberculosis of the bones Rollier's plates show the most remarkable changes following exposure of the body to sunlight, and it seems that these changes are proportional to the degree of pigmentation of the skin. He states that phalanges which have entirely disappeared to x-ray examination, may be recalcified so completely as to be indistinguishable in radiographs from normal bones. Adults seem

(3) Bayne-Jones, S. and Van der Lingen, Bactericidal Effect of Light, *Bull. Johns Hopkins Hosp.*, 1923, Vol. 34, p. 11.

to be as easily affected as children. So also in tuberculous sinuses and ulcers, in glands of the neck, in pleural and peritoneal effusions, ultraviolet light has a most beneficial action, and his statistics seem to bear out these claims. Similar beneficial results are claimed in tuberculosis of the lungs, but here the pulmonary congestion noted in animals shows itself again in the increased tendency to haemorrhage which is seen in certain patients following heliotherapy.

The more recent studies of Park, of Hess, and of other observers on the effects of light on rickets have shown that the calcium metabolism undergoes a marked change. Skiagraphs of the bones show a rapid deposition of calcium, and in spasmophilia the stridor rapidly diminishes following exposure to light. This replacement of the vitamine of cod liver oil by an undoubted physical agent throws open a wide field of conjecture as to the actual rôle played in nature by the accessory food factors.

It is safe to say that the study of light and its action on the normal and pathological metabolism of the body will occupy an increasingly important position in the realm of medical research in the next decade. D. S. L.

LACTIC ACID PRODUCING ORGANISMS

RECENT clinical experience with the use of milk artificially soured by inoculation with lactic acid producing organisms, has revived the interest in this subject aroused by Metchinkoff's book *The Prolongation of Life*.[1] Among others, the theory that Metchinkoff propounded was, that many human ills and premature senility, were in a large measure due to auto-intoxication from the large bowel, that this intoxication was due to a toxin liberated by certain forms of bacterial life inhabiting and multiplying in the intestine. Finally he thought that the digestive tract could be freed from these pathogenic forms by the use of lactic acid producing organisms given by mouth in milk, which destroyed the toxin producing organisms by their implantation and growth, while they themselves and their products were innocuous. The bacillus used by Metchinkoff was *B. bulgaricus* in milk cultures.

Shortly after the appearance of Metchinkoff's work, Herter[2] of New York fed large amounts of *B. bulgaricus* in milk, to a monkey, to show that the intestinal flora could be altered by the growth of *B. bulgaricus* in the intestinal canal. He found that, although lactic acid was present throughout the digestive tract, below the ileocaecal valve, the regions characterized by most active putrefaction and toxin production according to Metchinkoff, the lactic acid producing organisms failed to establish themselves in relatively large numbers; that is, the supposedly toxin producing organisms of the caecum were not ousted by the ingestion of cultures of *B. bulgaricus*.

In a recent article,[3] however, experimental evidence is produced to show that Metchinkoff was in reality dealing with *B. acidophilus* and not *B. bulgaricus*, and workers at Syracuse University[4] have demonstrated that the intestinal flora in man can be definitely altered by the feeding of *B. acidophilus* milk cultures, with a displacement of the putrefactive organisms from the large intestine. The use of these cultures in the treatment of chronic constipation, auto-intoxication, intestinal toxaemia, mucous colitis, and sprue has yielded remarkably good re-

(1) METCHNIKOFF, S., *The Prolongation of Life*, N.Y., 1907.

(2) HERTER, C. H., *J. Biol. Chem.*, 1908.

(3) CHEPLIN, H. A. AND RETTGER, L. F., A treatise on the transformation of intestinal flora, New Haven, Conn., *Yale Univ. Press*, 1921.

(4) CHEPLIN AND RETTGER, *B. acidophilus* and its therapeutic application, *Arch. Int. Med.*, 29 Mar., 1922.

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sults in the cases reported by several writers.[5] These good results consisted in normal bowel movements, gain in weight and strength, and absence of symptoms of intoxication. According to Cheplin, Fulmer and Barney[6] the beneficial effects in simplifying the complex fecal flora by the daily ingestion of a litre of *Bacillus acidophilus* milk are manifested in two ways, (1) In the constipation group the physical characteristics of the feces are changed, becoming yellowish, soft, comparatively odourless resembling the infantile type of stool, elimination of pain and straining at stool follows also. In the diarrhoea and mucous colitis group there is a gradual formation of the fecal material, finally resulting in soft, light, and partially formed stools with a complete disappearance of the mucus. (2) Marked improvement in the clinical picture by relieving the toxic symptoms which previously existed.

If the conclusions of these workers are accepted, there is open a large field of gastro-intestinal disorders for treatment and investigation along this line, not only those cases which may be classed as intestinal intoxication, colitis, and constipation, but also the acute specific infections such as typhoid fever and dysentery. It has already been shown[7] that administration of lactose to typhoid fever patients shortens the course of the disease, conserves the body weight and produces a definite change in the intestinal flora, with the production of one similar to that found after the ingestion of *B. acidophilus*. It is quite possible that the implantation of this organism in the digestive tract might, by its growth and multiplication, inhibit the growth of *B. typhosus*. It has also recently been suggested[8] that the digestive tract may be the origin of some obscure cases of arthritis and iritis; that due to a damaged intestinal wall certain organisms gain entrance to the blood stream and set up inflammation by localizing in the affected areas. The ingestion of *B. acidophilus* would possibly prevent these intermittent blood stream infections from the bowel, by permitting nature to repair her damaged defences by the removal of certain pathogenic organisms from the digestive tract.

It is not definitely known whether the beneficial effects produced by the feeding of *B. acidophilus* milk, or milk soured by other lactic acid producing organisms, to athreptic infants, are due to the presence of the organisms themselves, or to the lactic acid produced by them. However, the latter would appear probable since the addition of commercial lactic acid in proper proportions to sweet milk, produces equally good results in infant feeding,[9] apparently by the neutralization of the "buffer" of ordinary cow's milk. The effect on the infantile intestinal flora, of the feeding of *B. acidophilus* has not been brought out.

However, it would appear that, although the feeding of *B. acidophilus* may not be the "fount of immortality," as Metchinkoff's *B. bulgaricus* was for a time thought to be, it has a definite place in the therapy of constipation and even more particularly in those cases of intoxication due to absorption from an unhealthy digestive tract, unhealthy because of the presence of pathogenic putrefactive organisms. R. R. S.

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(5) Cheplin, H. A. and Wiseman, J. I., Observations on the effects of Acidophilus Milk upon cases of chronic constipation, *Boston M. & S. J.*, 185, Nov. 24, 1921. Gampertz, L. M. and Varhous, M. G., Observations on *B. acidophilus*, *Med. Rec.*, 100, Sept. 17, 1921. Bacteriological and clinical experience with *B. acidophilus*, *J.A.M.A.*, 80 (Jan. 13), 1923. Norman, N. P. and Eggston, A. A., Pyogenic infections of the digestive tract and their biological treatment, *N. Y. M. J.*, 115, Apr. 19, 1922.

(6) Cheplin, H. A., Fulmer, H. C. and Barney, C. O., Studies on the therapeutic action of *B. acidophilus milk*, *J.A.M.A.*, June 30, 1923.

(7) Torrey, J. C., The fecal flora of typhoid fever and its relation to various diets, *J. Infect. Dis.*, 16, 1915.

(8) Irons, E. E., Some less frequent considered portals of infection in Arthritis and Iritis, *J.A.M.A.*, June 30, 1923.

(9) Marriott, W. McKim, Notes on infant nutrition, 1923.

Editorial Comment

LABORATORY AND HOSPITAL

"Research work" and "scientific" are terms which to the laity generally connote work carried out by the aid of the microscope, with test tubes or glass retorts. Such an idea is only a half-truth and perhaps even by some in the medical profession is accepted as the whole truth. Medicine is still in need of men of great powers of observation in the wards or out-patients' department, who like Sydenham can picture for us the symptoms and course of a disease, in short its natural history. Such men even if they only recognize and make plain a new symptom-complex add much to science and are entitled to the same rewards as the laboratory worker.

Sir Berkeley Moynihan has lately written a letter to *The Times* on this subject which we quote in full.

"The leading article in *The Times* of July 25 calls attention to a truth which lacks adequate recognition. Clinical research and the toilsome discoveries of new technical methods are as fully entitled to the term "scientific" as any of the good work done in our laboratories. The complexities of clinical research are so intricate, and because of the human material upon which they are conducted are so bewildering as perhaps to surpass all forms of laboratory research in difficulty. They call for qualities of insight, imagination, patience, and intellectual integrity to a no less considerable degree. The practice of clinical medicine or surgery makes a further heavy demand upon qualities of temperament and of character which are little exercised in the cloistered tranquillity of the laboratory. Yet the rewards open to the clinical investigator by the only scientific body competent to give them, the Royal Society, are consistently withheld. The present President of the Royal Society is a medical man whose life has been spent in the laboratory, with the result that physiology and general medicine have been permanently and very greatly enriched by his labours. But there are physicians and surgeons whose lives have been spent in the wards and in the operation theatres of our hospitals whose contributions to 'scientific' medicine are entitled to rank even with his. The joint and separate labours of the laboratory worker and of the clinician are both, perhaps equally, necessary for the future progress of medicine in all its branches. Both are deserving of recognition at the hands of those empowered to confer it; in 'scientific' value one does not surpass the other."

The Canadian Tuberculosis Association held its annual meeting in June at Edmonton. Following on this, it has collected and put together for distribution all the addresses and papers then read. No more admirable method could be adopted for the spreading and rendering more permanent continuation of the influence which such a meeting represents. To look through these papers will make one feel much of the enthusiasm and appreciate the unfaltering efforts which have characterized the work of the Association.

The address by the retiring president emphasizes the importance of the public backing their efforts; and this can be obtained only by continually showing the people the results of the work done by the Association, and the need for doing much more. A fine incentive to further work too, is given in the account by Dr. Parfitt of the evolution of the sanitarium in Canada. The Association may well be proud of the results obtained in Canadian Institutions during the last twenty-five years. The more strictly clinical aspects are treated in a series of papers which gain greatly in value because of their practical nature and their clearness in statement. The following subjects are discussed in some of the papers presented at the meeting, and deserve careful attention: The detection of incipient disease; The association of tuberculosis with cardiac disease, by Dr. Ferguson of Fort Qu'Appelle; The conclusions deducible from an analysis of 175 case histories, by Dr. Boughton of the same sanatorium. There is also a review of the methods and means of diagnosis in Montreal clinics by a French colleague, written in much-to-be-admired English.

Other papers of an important character are, Tuberculosis from the point of view of the medical officer of health, by Dr. Arthur Wilson of Saskatoon; Bovine tuberculosis in relation to public health, by Dr. Torrance, Veterinary Director General, and Tuberculosis in connection with immigration, by Dr. D. A. Clark, Department of Health, Canada.

For the teacher no aspect of the subject presents more difficulty or is in need of more earnest thought and effort than that dealt with by Dr. D. A. Stewart in his paper on "Teaching about Tuberculosis." He dwells on the depressing infrequency with which the really incipient case is seen at the sanatorium. The teaching, he says, must radiate from the sanatorium, and teachers must be enthusiasts, for "torches are not lighted at icebergs." Tuberculosis should be a subject on the programme of every medical convention and society.

A final group of papers, read before the Provincial Health Officers' Association of Ontario, makes an excellent symposium on tuberculosis in children.

The Manitoba section of the American College of Surgeons held its meeting in Winnipeg on September 10th and 11th. Opening with a clinical address by Dr. Chas. H. Mayo, there was a full and varied programme, covering a hospital session in the morning, with Dr. D. S. Mackay of Winnipeg in the chair. After several excellent addresses by American confrères from Chicago, Rochester and Battle Creek, Dr. McMillan of Winnipeg spoke on the organization of an x-ray department; Dr. Fred. C. Bell on the essentials for good case records, and Dr. Boyd on Pathology in the Hospital. The annual meeting of the Fellows of the College was held in the afternoon, and a public Community Health meeting in the evening. The second day was taken up with hospital clinics held in St. Boniface Hospital, and a scientific session held in the Fort Garry Hotel.

We have received Bulletin No. 3 of the Medical Society of Nova Scotia. It is a publication which represents much energy and enthusiasm, and while there is in it an appeal from the associate secretary for more support, the quality of this particular number is a matter for congratulation. In bringing together reports from the various societies, associations and hospitals of the province, the Bulletin has a large field to cover. There can be no doubt that it performs a function of great value to the practitioners of Nova Scotia. A good many matters are discussed of local interest, but also many of general interest to the profession. The latter we would be glad to have discussed also in our *Journal*. To secure this we will be glad to print letters from individual members or from officials of the Medical Society of Nova Scotia.

The St. John Ambulance Association issues from its head office in La Banque Nationale Building, Ottawa, first aid bulletins. These give notice of the various activities of the Association, with news items from the provinces, and must prove of interest to members of the Association throughout Canada.

The Manitoba branch of the Tuberculous Veterans' Association has published an annual, with the object they explain, of assisting in the fight against the disease, of correcting false impressions, and of helping those who have tuberculosis. While in no sense a scientific publication, this booklet will serve an excellent purpose, and will aid materially the attainment of the objects proposed.

The Association

FINANCES OF THE ASSOCIATION

Acting upon the resolution of the Annual Meeting in June last, 20 One-Hundred-Dollar Bonds have been drawn by lot for redemption on October 1st.

The serial numbers of bonds so selected are, 5, 15, 21, 36, 45, 51, 71, 74, 78, 81, 84, 98, 116, 120, 126, 130, 132 133, 144, and 161.

Holders of these bonds have been notified by letter to draw upon the Association through the Bank of Montreal, Peel Street Branch, Montreal, attaching the bond for redemption to the sight draft.

Men and Books

ABRAHAM GESNER

In Campbell's *History of Nova Scotia*, a reference is made to Dr. Abraham Gesner, who was born towards the end of the eighteenth century at Cornwallis, Nova Scotia. Dr. Gesner's father was a native of what is now the State of New York, but fought for England in the Revolutionary War, and lost all his property in consequence of his loyalty to the throne. After the war Colonel Gesner removed to Nova Scotia, where some years later Abraham was born. In early life young Gesner explored the West Indies and South America rather extensively to enlarge his opportunity for the study of natural history. In these travels he was twice shipwrecked. He then went to England, where he pursued his medical studies under such authorities as Abernethy and Astley Cooper. Apparently, however, he did not devote much time to medical practice, as we find that he was attached to a geological survey party in New Brunswick from 1835 to 1842. By this time he had collected quite a museum of natural history, which he presented to the Mechanics' Institute of St. John. Later he accompanied Sir Charles Lyall on a geological tour through Nova Scotia.

His chief claim to distinction lies in his discovery of kerosene oil, and of the means of extracting it from coal and other bituminous substances. He established two large oil-manufacturing plants in New York, and succeeded in marketing his products in many parts of the world. He wrote extensively, mainly on scientific subjects, his works being characterized by lucidity and soundness. He died at Halifax in 1864. W.H.H

Scientific Nutrition.—"A few years ago it was customary to compare the human body to an engine, and the food to the fuel which is consumed in making the engine go." To-day it is better "to liken the nutrition of the body to some complex process of manufacture in which chemicals are used." It is important to have the right chemicals in the right proportions. This is from the second article by Dr. E. V. McCollum in the June issue of *Hygeia* and he supports his assertions by the results of the comprehensive studies on animal feeding that have been going on everywhere. All proteins do not have the same value; vitamin-containing materials are necessary and the proportion of the different food constituents must be correctly arranged. Dr. McCollum insists that the average American eats plenty in actual quantity but takes insufficient milk and green vegetables, especially those eaten raw. These are far superior to cereals, potatoes and other roots.

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Correspondence

BRITISH MEDICAL ASSOCIATION ANNUAL MEETING

The following interesting letter has been received from Dr. A. D. Blackader, Editor of the *Journal*.—Assist. Editor.

The ninety-first annual meeting of the British Medical Association was held this year in Portsmouth during the fourth week in July, and must be regarded in every way as a success. More than one thousand members were in attendance, among whom were representatives from every part of the Empire, indicative of the Imperial character gradually being assumed by the Association. The three aims of the Association: the promotion of medical knowledge, the maintenance of the honour and higher interests of the profession, and the fostering of a feeling of good fellowship among its members, were all notably forwarded at the meeting.

The opening address by the President was an able presentation of the necessity of obtaining good sanitary conditions with abundance of sunlight and fresh air for the development of healthy life in every home. The dual position held by Mr. Childe in Portsmouth as Senior Surgeon to its chief hospital, and Chairman of the city's Health and Housing Committee specially fitted him to speak on this subject and to emphasize the disastrous influence of bad environment on the homes of the poor, especially such as exist in the slum areas of industrial centres where overcrowding, defective hygienic conditions, and deficient, or almost total absence of, sunlight have a most deteriorating effect on both health and morals, and greatly favour the development of endemic disease, especially tuberculosis, rickets, venereal disease, and alcoholism. Only a passing reference was made to cancer as it must at present be regarded as a disease of which as yet little is known. The inclusion of alcoholism as a disease might by many be questioned. It must be acknowledged that it is also a vice; yet notwithstanding its moral aspect it must be regarded in a great number of cases as a disease fostered by unfortunate environmental conditions in the home and family. While the endeavour of America to cure the evils due to alcoholism by compulsion is watched by the profession in Great Britain with interest, the better way, in the opinion of the speaker, was to strengthen the character of the people by improved living conditions and to remove the many ever-present temptations to drink. While the prevention of tuberculosis by the installation of healthy dwellings, with a greatly increased amount of sunshine in both home and workshop is to be preferred to treatment in costly sanitoriums after it has developed, nevertheless both are demanded at the present day, and it is probable that for many years yet we will have to deal with its end products as well as with its active and predisposing causes. Mr. Childe made reference in passing to the part played by coal smoke in lessening the amount and the effectiveness of sunshine, and to the possibility and great desirability that in the near future some definite abatement of this harmful nuisance in large cities may be effected.

In reference to rickets the President called attention to its disabling results and to the prompt improvement which takes place under improved hygienic conditions, proper dietary, fresh air, and sunlight. Mr. Childe also emphasized by quoting from reports of the health officer of Glasgow the shockingly evil results of the overcrowding which occurs in the slum districts on the standards of morality and the frequency of venereal disease. The industrial revolution which took place in the last century accounted in great part for the urbanization of the population and the herding together of thousands of workers in the centres of industry. Shorter hours of work and more rapid means of conveyance now permit the worker to live at a distance from his work. Air space and sun space around a house are of more importance than its size or than the presence in it of a parlour rarely used. While the environment of the homes of the wage earning classes in our industrial centres may in part be a sociological question, it is inseparably linked up with, and is in fact the greatest of, all our prob-

lems of preventive medicine, and it is up to the medical profession individually and through its societies to educate public opinion on the urgent necessity of fresh air and sunlight in homes and workrooms.

In the scientific and clinical sections many interesting papers were presented and were followed by valuable discussions. In the Section of Medicine a discussion on diabetes and insulin occupied the first day. The President, Sir Thomas Horder, Bt., in his opening remarks stated that diabetes at present must be regarded as the result of several biochemical disturbances; the administration of insulin in his opinion might be of service in marking off the different types of the disease. Insulin was undoubtedly the greatest contribution made to the study of diabetes, but it was doubtful if it would solve all problems in its treatment.

A very hearty welcome was extended to Dr. Banting who detailed the story of his successful research and gave exact directions for using insulin if the best results were to be obtained. A general discussion followed the reading of his paper. Dr. Graham of London, said that sugar tolerance in his experience could to a certain extent be recovered under treatment. An important point in the treatment was to make certain as to whether the blood sugar was normal in the morning before the dose of insulin was given. No carbohydrate, except that present in vegetables should be added to the dietary till the morning blood sugar had been normal for three or four weeks. In closing the discussion at the request of the President, Dr. Banting stated that continued treatment was necessary in severe cases: patients, however, could be trained to give injections to themselves. Larger doses were always necessary at the outset of treatment. It was easier to treat a long-standing elderly diabetic than a young and early case. As an increase in blood sugar stimulated the pancreas it was desirable to maintain the blood sugar as nearly as possible at its normal level. The more frequent and prominent symptoms of hypoglycaemia were trembling of the muscles with a feeling of uneasiness or of impending disaster, and in children, pallor, increased frequency of pulse and sweating. These symptoms may be followed by a feeling of hunger and sleepiness, incoherent speech, and coma. Adrenaline (min. x.—min. xv, hypodermically) would usually render a comatose patient conscious owing to its rapid action in the mobilization of glycogen from the liver. This must be followed by giving glucose. If the patient were sufficiently conscious he should be given 10 to 20 grams of glucose by mouth.

In all the sections the papers read were of a high class and were presented in an interesting manner. Abstracts of all will appear as promptly as possible in our *Journal*. Of special interest to the writer was the paper on the nervous child read by Dr. Hector Cameron, of London, in the section of neurology. Dr. Cameron began by drawing attention to certain physical characteristics of which the more important were a deficiency in muscular tone giving rise to a peculiar stance with some lordosis and a protuberent abdomen and pallor due to a vaso-motor anaemia. Such a child was apt to suffer from enteroptosis and constipation and from attacks of abdominal pain liable to be mistaken for appendicitis. Catarrhal affections with irregularities in the temperature chart were not infrequent. The origin of many of the nervous symptoms was often found in a study of the parents' dealing with the child. The young child was highly suggestible, quick to catch and to make use of any anxiety aroused in the family by its ailments. The desire to attract attention and of self-assertion was a common symptom which might lead to acts of a distressing character. These children often displayed a strongly negativistic attitude well exemplified in certain cases of anorexia nervosa. Many of these symptoms could be traced to faulty management on the part of those in charge. Suggestions made by mother or nurse often caused much difficulty, and in the treatment of such cases the home life of the child must be carefully studied. Sir Robert Armstrong Jones of London, recalled the pedagogic maxim of "Don't say don't" and emphasized the importance of sleep for such children who should be made to sleep for nearly twelve hours out of the twenty-four.

At the annual meeting of the representatives of the various branches which took place a few days before the general meeting there were present the following delegates from the Overseas Dominions:—The Hon. W. E. Collins, M.D., and Dr. R. C. Begg (New Zealand),

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Major-General Sir Gerald Giffard (Madras), Colonel Ashton Street (Bombay), Sir Joseph Verco (South Australia), Dr. A. C. Lankester (Central Provinces), Dr. E. C. Dean (Western Australia), Dr. John Hutson (Barbados), Dr. F. J. A. Beringer (Sierra Leone), Dr. J. A. R. Glennie (Singapore), Dr. J. V. Manning (Orange Free State), Dr. E. P. Baumann (Transvaal), Dr. G. W. B. Daniell (Cape of Good Hope), Dr. O. Marriott and Dr. G. Duncan Whyte (Hong Kong and China), and Dr. L. E. Ellis (New South Wales). Canada, it will be noted, is the only important Dominion unrepresented.

The following overseas representatives on the recommendation of the Council were made Vice-Presidents of the Association: Mr. George Adlington Syme, M.S., F.R.C.S., of Melbourne; Dr. Robert Henry Todd, of Sydney; Dr. Harry Edward Gibbs, of Wellington, N.Z.; Dr. Wilfred Watkins-Pitchford, of Johannesburg, and Dr. Dugald Campbell Watt, of Pietermaritzburg, S.A. It was also stated that the Council considered themselves fortunate in having persuaded Sir William Macewen to undertake the office of ambassador of the Association to the Australasian Medical Congress and that he would go out in September. In this connection we may quote from the speech of Sir Joseph Verco, who responded on behalf of the oversea branches to the toast of the British Association at the annual dinner, "I desire here to announce the loyalty of my own and of all the Australian branches of the Association.. We are pleased that the Council has granted them all individual incorporation. I have pleasure in stating that we all consider that we have all possible liberty. We have our own Journal, our own buildings, our own banking account, our own federal committees, our own professional rules and regulations, and at the same time we may rely on the assistance and advice of the parent association whenever they may be requested.

ANNUAL MEETING OF THE COLLEGE OF PHYSICIANS AND SURGEONS OF THE PROVINCE OF ALBERTA

To the Editor:

The College of Physicians and Surgeons of the Province of Alberta a year ago amended their by-laws providing for an annual meeting of the members of the College when the President would review the work of the Council during the year and receive from the members of the College any comment or suggestions they might feel free to give. In accordance with this provision, the annual meeting of the College was held in Calgary, September 6th, 1923.

One question that was up for discussion was the question of contract practice. According to the code of ethics "It is unprofessional for a physician to dispose of his services under conditions that make it impossible to render adequate service to his patient, or which interfere with reasonable competition among the physicians of a community. To do this is detrimental to the public and to the individual physician and lowers the dignity of the profession."

Notwithstanding this, contract practice is prevalent throughout the Dominion of Canada, and it is felt that the time has come to make a definite pronouncement on what kind of contract practice and under what conditions permission will be given medical men to enter. It was felt that the only place where there was an excuse would be in isolated mining or lumber camps, but in large towns and cities, railroad employees, lodge members, workers in factories, etc., should not be limited to a certain individual doctor or a small limited group, but they should have their freedom of choice to choose whomsoever they may wish.

It was felt that there should be some system of Dominion registration by which doctor's records could be kept in some central office so that men found guilty of violation of the laws in one part of Canada would find it more difficult to register in another and continue their similar conduct.

The Workman's Compensation Act came up for consideration and it was felt that it would be better to have a medical Board of Appeal appointed by each Workman's Compensation Board who would handle important questions in dispute and on whose report the Commissioner would grant compensation or remuneration for medical aid. Accidents sometimes resulted in fatal disease, families were deprived of the assistance of the father. The question, therefore, was of great moment to the widow

whether the disease followed the accident and she would receive compensation or not.

The Council of the College of Physicians and Surgeons of Alberta met during the first week in September and erased the names of two men from the register who had been found guilty of illegally prescribing narcotic drugs. They considered two applications from men transferring from other provinces and refused to register them because from government reports they had been guilty of violating the laws of the country and of unprofessional conduct. The Alberta Council has gone on record that they are going to use severe measures in future in dealing with all men who deliberately and knowingly violate the laws of the country.

The question of hospital interns was discussed and as these are not used in this western country, a special committee is being appointed to investigate the whole question with the University, the Alberta Hospitals Association and the Medical Council of Canada. They will confer with Manitoba University as well with a view to agreeing on a basis for Western Canada *that will be comprehensive in character.*

The Council went on record also that pressure should be brought to bear on the Medical Council of Canada to reduce the fees for registration from $100.00 to $25.00 to all members of the profession who were entitled to registration without examination by virtue of the ten years' practice clause. It seems unreasonable that a medical practitioner who has his provincial license by examination is able to get his British Registration for £5, which gives him access to every province in Canada barring British Columbia, as well as the British Empire outside. Yet in order to get a Dominion license, which includes all Canada, a $100.00 fee must be paid. The various Medical Councils in the provinces of Canada are to be asked to consider this phase of the question and see if something can be done.

W. G. HUNT,
Ass't to Registrar.

Calgary, Sept. 19, 1923.

The Favorable Prognosis of Auricular Fibrillation.—In a group of thirty-seven patients with auricular fibrillation, whose cases are reported briefly by T. Homer Coffen, Portland, Ore., about three-fourths are ambulatory, while one-fourth have died. Half of the entire number are comfortable and able to carry on their daily activities without cardiac symptoms. Some of these have decreased reserve on unusual effort. About one-fifth of the entire number have more marked limitation of cardiac reserve, and while ambulatory, are more or less incapacitated. Most of these have needed digitalis at one time or another, or have learned how to use it to safeguard the heart. The heart is able to adjust itself to auricular fibrillation, and to compensate as it does in valvular lesions. When both fibrillation and valvular lesions (or cardiosclerosis) are present it may still compensate well for months or years, the prognosis depending on the sum total of symptoms and signs which largely indicate cardiac function. Evidences of myocardial weakness are largely clinical, but changes in the Q-R-S-T complexes, in repeated electrocardiograms, aid in measuring the progress of degenerative changes.—*Jour. A. M. A.*, Aug. 11, 1923.

The Classification of Heart Pain.—Heart pain is classified by P. D. White and J. E. Wood, Boston, as follows: 1. Simple fatigue pain: (*a*) Chronic hypertension; (*b*) aortic stenosis or regurgitation; (*c*) mitral stenosis; (*d*) pulmonic stenosis—congenital heart disease; (*e*) adherent pericarditis; (*f*) paroxysmal tachycardia or paroxysmal auricular fibrillation or flutter; (*g*) permanent auricular fibrillation or flutter with high ventricular rate, and (*h*) permanent coronary narrowing due to arteriosclerosis. 2. Nervous heart pain, including effort syndrome. 3. Paroxysmal heart pain (probably of coronary disease or irritability), the so-called true angina pectoris. 4. Pain of coronary thrombosis. 5. Aortic pain, of syphilitic aortitis and aneurysm. 6. Pain of pericarditis. Frequently, combinations of these factors occur.—*Jour. A. M. A.*, Aug. 18th, 1923.

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Abstracts from Current Literature

MEDICINE

Splenic Anaemia: A Clinical and Pathological Study of Sixty-Nine Cases. Chaney, W. C. *Amer. Jour. Med. Sc.*, June, 1923. Vol. 165, p. 856.

Chaney's report is based on a study of sixty-nine cases of splenic anaemia on whom splenectomy was performed at the Mayo clinic between November, 1905, and September, 1920. These cases belonged to the group described by Osler as "primary splenomegaly with anaemia" Rolleston considering them separately as chronic splenic anaemia and a terminal stage "Banti's disease" proper in which ascites has developed.

Pathologically, the spleens removed, showed a generalized fibrosis. The average weight was 1,000 grams (over eight times normal). The spleen tends to maintain its shape and is very firm and resistant to cutting, but there is no special diagnostic feature. There did seem to be a tendency towards reduction in the size and number of the Malpighian corpuscles with the increasing fibrosis, and for the central artery to become eccentric.

Clinically, the disease had existed for an average duration of seven years prior to splenectomy. The patients varied in age from two and one-half years to sixty-nine years, the average age being thirty-three years and the sexes being equally divided. The symptoms chiefly complained of were mass in the upper abdomen, haemorrhage from the stomach, and weakness. Of less importance were pain, indigestion, and diarrhoea. Gastric haemorrhage often alarming, with or without melaena, was present in two-thirds of the series. Pain seemed to be due not infrequently to a perisplenitis, occasionally evidenced by a friction rub. In thirty-three cases marked perisplenic adhesions were found.

The size of the spleen at operation as compared with the clinical findings was interesting. Spleens described as "just felt" were about 400 to 425 grams.; one inch below the cortal border, about 520 grams; and where the spleen reached to the level of the umbilicus and extended to the midline, the weight was generally about 1,000 grams.

At operation, thirty patients were found to have definite hepatic cirrhosis. In only thirteen of these was the liver larger than normal. The size of the liver seemed to have no relation to the size and weight of the spleen. Ascites was present in twenty-three cases with cirrhosis.

In the sixty-nine patients, the average red blood count was 3,700,000, the haemoglobin 53% and the leucocytes, 4,990. Anaemia of the secondary type and leucopenia were the rule; variation in size and shape of the red cells being noted in half the cases, with normoblasts in twelve cases.

After operation there was noted a progressive increase in the leucocyte count—to above normal about the forty-fifty day—then a decline to normal in about seventy-five days. There was improvement in the haemoglobin and the red count but no sharp conclusions could be drawn. The coagulation time and the fragility tests were normal, and the Wassermann reaction and stool examination were negative.

In practically none of all the sixty-nine cases where the liver was examined was the tissue normal. In thirty cases (the average age of these patients being thirty-five years) showed a definite cirrhosis. The chief complaints were essentially the same as those without cirrhosis. Jaundice was noted twice. Twenty-four of these cases with cirrhosis presented ascites, in ten of which it was noted before the operation. The mortality after operation was higher in those in whom a marked cirrhosis existed, especially when associated with ascites. A. T. HENDERSON

The Clinical Criteria of Activity in Pulmonary Tuberculosis. Ringer, P. H. *Am. Jour. Med. Sc.*, May, 1923.

It is often difficult to answer the questions whether any patient has *active* tuberculosis or whether the disease is *more* active or less active than on previous examination. Ringer has given us a very common-sense paper on this problem. Many are the definitions of activity but probably the best of those presented by the author are: "Tuberculous disease as opposed to tuberculous infection," or; "Evidence of poisoning, local and general, by the toxins of the tubercle bacillus."

Only a few of the most important points can be given here. In regard to the X-ray, Ringer thinks it is of great diagnostic aid as corroborating other pathological evidence or merely sug-

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gestive symptoms. He says the X-ray will almost invariably shame the examiner's fingers and ears but the plate presents a pathological picture rather, and ordinary methods of physical examination a clinical one. Shadows of peribronchial thickening, or even "cotton-ball shadows" of various sizes in the presence of other signs of activity, indicate active disease; in the absence of other signs of activity these X-ray signs must not be disregarded but taken seriously; we cannot say there is no active trouble and simply must keep the patient under careful supervision.

Ringer finds it important even at this date to emphasize the fact that basal râles are of infinitely less importance than apical râles. He also states that, although as a general rule moist râles can be distinguished from dry râles, in the case of borderland sounds the personal equation plays such a part that an absolute standard is not obtainable. And, of course, it is the moist râles that indicate active trouble. Pleuritic friction plus other evidences of illness is a very important physical sign.

It is possible for patients with a quiescent lung lesion doing a full day's work to expectorate only a minute quantity of sputum per day or per week which always shows tubercle bacilli. "If such individuals are to be classed as 'active' cases, they have at any rate achieved an economic recovery which is the great goal of all the tuberculous and the question of 'activity' becomes one of merely academic interest." In the author's opinion, neither the Arneth differential count of the leucocytes or the serum complement-fixation test can as yet tell us accurately whether the lesion is active or not.

Ringer lays greatest stress upon a study of symptoms to tell us whether the lesion is active or more or less active; for the man doing general work the symptoms must be considered which alone can determine the relative strength of the invading parasite and the powers of resistance in the invaded host. The physical signs may not decrease but remain stationary, yet the symptoms and the ability of the patient to take more exercise speak plainly that the disease is less active. ARCHIBALD MALLOCH

Metabolic Studies in Pernicious Anaemia. Gibson, R. B., and Howard, C. P. *Arch. Int. Med.*, July, 1923. Vol. 32, p. 1.

Studies on eleven cases of pernicious anaemia are reported with, for comparison, similar observations on four cases of anaemia not of the Addisonian type.

In general, the authors found that the patients did well on a diet of fruits, green vegetables, lima beans, sweet potatoes, egg yolk, and liver (daily), with relatively little fat but rich in "food iron." On very moderate protein and caloric intakes (1,500-1,900 calories daily) most of the series showed a positive nitrogen balance and a retention of iron which corresponded closely with the rise in the haemoglobin values of the blood. They were unable to find any excess of unsaturated fatty acid either in the stools or in the blood, and consequently regard this as added proof against there being any possible relation between these acids and the increased haemolysis seen in pernicious anaemia. In general, the urine showed low figures for the urea and ammonia, but a high uric acid excretion. A plea is presented for the continued use of the older haematinic drugs, iron and arsenic. D. S. LEWIS

Blood Concentration Changes in Extensive Superficial Burns, and their Significance for Systemic Treatment. Underhill, F. P.; Carrington, G. L., *et al. Arch. Int. Med.*, July, 1923. Vol. 32, p. 31.

Attention is drawn to the similarity between the immediate results of war gas poisoning and of extensive burns of the body surface by heat. The victims of a theatre fire in New Haven, offered a large series for observation with interesting results.

The first feature in severe burns is a marked concentration of the blood, during which the haemoglobin may rise to 230 per cent., the average level in fifteen cases being 175 per cent. If untreated, this concentration of the blood may persist for a week following the burn with a continuance of the well known symptoms of delirium, unconsciousness, and collapse, but following active treatment these symptoms rapidly disappear. In addition to the usual paraffin dressings, the routine treatment consisted in the forcing of fluids by mouth, rectum, under the skin or by vein to the extent of from four to eight litres *per diem*. As a result of this large intake there was marked symptomatic improvement, the haemoglobin rapidly fell and remained within normal limits after the first forty-eight hours.

Careful examination of the nitrogenous constituents of the plasma failed to show the presence of any specific toxic substance which might have accounted for the symptoms usually following

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severe burns. Any changes could be readily explained by the extreme concentration of the blood. The authors also present conclusive evidence that the impending shock, low blood pressure, and high temperature of these early cases, is the natural response of the organism to an extreme concentration of the blood.

The communication marks another step in the advance to a rational basis for our therapeutic measures. D. S. LEWIS

Quantitative Studies with Arsphenamine. Kolls, A. C., and Youman, J. B. *Bull. Johns Hopkins Hosp.*, June, 1923. Vol. 34, p. 181.

A quantitative method for determining the amounts of arsphenamine actually in the tissues is presented, and the authors have used this method in a study of the distribution of the drug through the body after its injection. They find that approximately three-fourths of the arsphenamine leaves the blood stream within a few minutes after its injection, but that traces may still be found in the blood twenty-four hours after treatment. The drug is stored in the liver, spleen, kidneys, lungs, cardiac and skeletal muscle, but excretion and alteration of the molecule markedly reduces the amount of the drug within three hours after the injection. The liver is a more important excretory organ for the drug than is the kidney.

In experimental animals the brain shows a much lower concentration of salvarsan than does any other tissue; while the cerebrospinal fluid in the first twenty-four hours shows such minute amounts that it cannot be estimated with accuracy; even though the method is sufficiently delicate for consistent results in dilutions of one part in five hundred thousand. D. S. LEWIS

The Importance of the Antagonism Between Potassium and Calcium for Pathology and Physiology. Zoudek. *Klinische Wochenschrift*, Berlin, February 26th, 1923.

An ion is defined as an atom (H. Na. Cl. K) or group of atoms (OH, SO^4, No^3) electrically charged. Positively charged ions are attracted to the kathode and are, therefore, called kations (H. Na. Ca.), while negatively charged ions are anions (OH. Cl. SO^4). A molecule such as Na. Cl. is an electrolyte.

A brief description of the ionic theory will facilitate comprehension of the subject. When an electrolyte, NaCl for instance, is dissolved in water, it exists in the solution not merely in the form of the salt, but also as its constituent ions or electrons. This separation which is called dissociation is to be distinguished from chemical decomposition; no evidence of free chlorine or free sodium can be detected chemically in a solution of sodium chloride. The proof that such dissociation takes place is found in the changes of the physical properties of the solution (Wood).

The condition of cell-colloids, their power of imbibition and precipitation, is largely influenced by the ions in the fluids flowing about the cells, notably the kations potassium and calcium. Potassium is monovalent, calcium divalent. Zoudek describes experiments proving the antagonistic action of these ions. Fertilized eggs of fundulus, for example, do not develop in water containing a monovalent kation such as sodium or potassium. They also die if placed in a solution of divalent or polyvalent salt. But if placed in a solution containing monovalent and divalent or polyvalent salts, the eggs remain alive, and development proceeds. Between these salts an antagonism exists which is in harmony with their electrical charges.

An experiment with a frog's heart showed that in a monovalent kation solution such as sodium chloride action ceased with the heart in relaxed condition; that a solution of calcium was also poisonous, while in a mixture of the two the action was resumed. Every change of ion equilibrium leads to a disturbance of cell function. In the frog's heart an increase of potassium content leads to strengthening of the diastole, an increase of calcium to strengthening of systole.

In the gastro-intestinal tract increase in potassium content induces increased tone and lively contractions, increase of calcium to diminished tone and cessation of spontaneous contraction. The action on the smooth musculature of the bladder, uterus, and blood-vessels is the same in principle. Experiments have shown that the excretory power for glucose in a frog's kidney is dependent upon the relation of calcium and potassium in the fluid passed through the kidney; also the onset of a general oedema depends upon disturbance of the calcium-potassium proportion in the fluid passed through a frog's blood-vessels.

Briefly, Zoudek maintains that the cell-function of the various organs is dependent upon a certain combination in which the antagonistic action of calcium and potassium is of striking importance, and that every interference with the kation equilibrium leads directly to disturbance

or at least a change, of function. But these changes parallel the changes seen in normal functional life, such as alternate relaxation and contraction of the heart and of the intestine.

The author has demonstrated that vagus stimulation has an effect similar to that of an artificial increase of potassium content; while sympathetic stimulation corresponds to calcium concentration. There is an inter-dependence between the ion equilibrium and nerve (i.e., vagus and sympathetic) function. The potassium-calcium antagonism represents absolutely the vagus sympathetic antagonism.

The functional activity of the cell or organ is bound up with alternating supremacy of electrolytes, notably potassium and calcium. Every functional change in the cell is accompanied not only by an alteration in the potassium-calcium relation, but also by the hydrogen-hydroxyl (H-OH) relation. A relative preponderance of calcium disposes the colloid electrolytes to dissociation of hydrogen, a relative potassium preponderance to dissociation of hydroxyl. Precisely how ion antagonism influences changes in cell form and metabolic changes is not clear. No doubt, changes in cell colloids and water content play a great part.

The author proceeds to apply the above principles to pathological conditions. Where an abnormal condition of the vegetative nervous system exists there is corresponding disturbances of electrolyte equilibrium. Vagotonia, for instance, is characterized by electrolytic change in the cell-membranes of certain organs in the sense of a relative potassium concentration; sympatheticotonia by a relative calcium concentration. Since the normal excitability of the vegetative nervous system is to a large extent dependent upon a normal hormone system, disturbances of internal secretion disclose themselves through disturbances of the vegetative nervous system and changes in electrolytic balance.

Instances in this connection are the diminution in calcium content in the blood in Basedow's disease, and increase in myxoedema. In tetany, in which the parathyroid glands are involved, the muscle phenomena are explained by the lack of calcium and consequent preponderance of potassium. This latter, it has been proven, leads to a local alkalosis. The author claims that a therapeutic proof of the correctness of this statement lies in the fact that the symptoms of tetany can be completely removed by the administration of acids and ammonium chloride.

Again, in cases of failures of compensation in the heart without anatomical lesion, the author holds that it is reasonable, in view of experiments with frogs' hearts in various potassium and calcium solutions, to assume a disturbance of the electrolytic relation of potassium and calcium, similarly to so-called functional disturbances of other organs.

The author holds that it is not reasonable to separate functional and organic diseases essentially from one another; and that the distinctions which we draw are merely the expression of the incompleteness of our methods, as result of which we always consider cell changes as morphological.

Since organic conditions are frequently bound up with functional conditions, it follows that in the former, electrolytic disturbances must play a part. The relations existing between the known electrolytes and the vegetative nervous system, point the way to rational therapeutics.

A. G. MORTHY

Prophylactic Vaccination against Acute Tonsilitis. Bloomfield, A. L., and Felty, A. R. *Bull. Johns Hopkins Hosp.*, August, 1923. Vol. 34, p. 25.

In a previous paper, the authors have shown that the carriage of a hemolytic streptococcus in the tonsil is associated with a high grade resistance to acute tonsilitis. This resistance only persists so long as the individual remains a carrier of this particular strain of streptococcus. In the present paper, they present a further series of ninety hospital nurses, of whom thirty-three were found to harbour hemolytic streptococci, while in fifty-seven the tonsils were free from this organism. About one-third of the entire series received three injections of a vaccine made from cultures of the particular streptococcus (total dosage 200 million), following which sixteen per cent. of those inoculated had mild attacks of tonsilitis with a loss of only four duty-days, while thirty-one per cent. of the unvaccinated developed quite marked seizures with a total loss of 100 days off duty.

The authors suggest that inoculation has a definite value in protecting those susceptible to acute tonsilitis.

D. S. LEWIS

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News Items

GENERAL NEWS

It is a pleasure to note that at the annual dinner of the British Medical Association held in the Town Hall at Portsmouth on July 26th, Dr. A. D. Blackader, Editor of the *Journal* was one of two who replied to the toast of the guests. His remarks are quoted in the *Brit. M. J.* Supplement of Aug. 4th. Speaking unofficially he said he would like to see the Canadian Medical Association affiliated with the British Medical Association but pointed out at the same time the difficulties in Canada with its scattered population as compared with a tight little community like England, of building up a strong national association. He must leave, he said, to the Secretary of the Canadian Medical Association to give the proper answer to the invitation from England to hold a Canadian Medical Association Meeting in that country. As a private member of the Canadian Association he desired to say that the proposed meeting would be received with the most sympathetic consideration. He would like to see at any rate, an exchange of delegates at the respective meetings of the two Associations. "In Canada," he remarked, "they looked to the Imperial Association with a great deal of respect and filial feeling, and any proposals for closer—even though sentimental—union would have their very careful consideration."

NOVA SCOTIA

A fine new hospital building is approaching completion at New Waterford.

The Annual Meeting of the Provincial Medical Board of Nova Scotia was held on the 18th of July, when much business of importance was transacted. The Board now requires of all candidates for its license evidence of preliminary education at least equivalent to the complete senior matriculation of a chartered Canadian University, followed by five years of professional study. The matter of requiring six years of professional study is under consideration. Drs. J. G. MacDougall and W. H. Hattie were re-elected President and Registrar respectively.

A meeting of the Lunenburg-Queens Branch of the Medical Society of Nova Scotia was held at Bridgewater on the 7th of August. There was a good attendance, and the programme proved most interesting and instructive. Dr. J. G. MacDougall, of Halifax, addressed the Branch on "Every day kidney and bladder conditions." The subject was treated exhaustively from the standpoint of etiology, pathology, and treatment, emphasis being laid on the prevention of extension of infection. A valuable discussion followed. Dr. H. A. Chisholm, of the Provincial Department of Health, spoke on the public health aspect of venereal diseases, and mentioned the desire of the department to re-open a venereal disease clinic in Lunenburg County. Dr. S. L. Walker, Associate Secretary of the provincial society, discussed the ethics of organization, pointing out that physicians should be the leaders in public health movements if such movements are to be carried on in the best interests of all concerned. New officers were elected, Dr. J. S. Chisholm being chosen as president.

At a well attended meeting of the Cumberland County Branch of the Medical Society of Nova Scotia held at Pugwash on the 13th of August, Dr. John Stewart, of Halifax, gave a very fine address on the present status of the cancer problem. The address was discussed by Doctors Avard, Bliss, Millar, and others. Dr. Walker was present and addressed a public health meeting in the evening at which the President of the Society, Dr. D. MacKintosh, presided. The society referred two matters to the Executive of the Provincial Society. One had to do with an inquiry as to the cause of the inadequate action taken by the Attorney-General's Department regarding a death said to have been caused by a cancer quack's treatment. The other brought up the question of the provincial society becoming responsible for the collection of local society fees.

A stated meeting of the Colchester-Hants Branch of the Medical Society of Nova Scotia was held in the drawing-room of the Nurses' Home at the Payzant Memorial Hospital, Windsor, on the 28th of August. Dr. A. R. Reid, the Vice-President, presided. Apart from routine business, the principal items on the programme were papers by Dr. W. H. Hattie, of Halifax, on "The Physician," and Dr. S. L. Walker, of Halifax, on "Ethical Reflexes." Dr. Hattie traced briefly the development of medical teaching, referred to present standards of medical schools and licensing bodies, and stated that nothing had been more effective in reducing popular resort to quackery than the more efficient preparation for medical practice which has become so general within recent years—although much credit must also be given to the interest in the care of health which has been aroused by sane publicity of public health authorities. The public expect, and are beginning to demand, competence, in those who practice the healing art, and it therefore behooves physicians to utilize every available means of keeping fully abreast of the advances in medical knowledge. Dr. Walker discussed the relationship of the physician to his colleagues and the public, and drew a picturesque comparison between ethical practices and reflex responses. He referred to the prevalence of more or less pronounced degrees of physical disability which are not receiving attention, and said that the activities of public health workers in revealing such conditions were opening up vast and at present untilled fields for medical practice. If physicians were to give more support to public health agencies, they would receive ample reward for what might appear to be merely altruistic interest.

Dr. H. A. Chisholm, of the provincial department of health, brought up the matter of admission of necessitous persons to the Nova Scotia Sanatorium. Patients are admitted to the Victoria General Hospital, and to the Hospital for the Insane, both Government Institutions, upon the certificates of physicians, and should they be unable to pay for maintenance therein, collection of a proportion of the cost of maintenance is made under statutory provision, from the municipalities in which they have their settlements. In the case of a person suffering from tuberculosis, however, admission to the Sanatorium at the expense of the municipality is possible only after consent of the municipal authorities has been obtained. This consent is frequently delayed and sometimes with-

held. The Branch decided to petition the provincial government to secure the legislation necessary to have the sanatorium placed on the same basis, in respect of admission of necessitous patients, as the other government institutions.

The presentation of case reports by Dr. Keddy, of Windsor, and Dr. Patton, of Truro, was postponed. After adjournment, the members were hospitably entertained and feasted by Miss Martin, the Superintendent of the hospital.

QUEBEC

Dr. Edward W. Archibald has returned to Montreal after spending a few weeks in England and France.

Sir Henry Gray of Aberdeen, recently appointed Surgeon-in chief of the Royal Victoria Hospital, has arrived to take up his duties. He was the guest of honour the other day at a dinner given by the Kiwanis Club of Montreal. Dr. George E. Armstrong spoke of the excellent work Sir Henry Gray had already done in the practice of civil and military Surgery and wished him every success in Montreal. The Rev. Father McShane and the Rev. Dr. Frank Charters on behalf of the clergy, Alderman Gareau on behalf of the City of Montreal, Colonel Alexander a representative of the military district, and Mr. Henry Elliott, K.C. on behalf of the legal profession, welcomed Sir Henry Gray to Montreal. In reply Sir Henry Gray thanked the previous speakers and spoke of the responsibilities and ideals of the surgeon.

ONTARIO

The Northumberland and Durham County Medical Society met at Cobourg on July 26th, Dr. S. L. Alexander of Toronto spoke on "Headache of Nasal Origin".

A meeting of the Peel County Medical Society was held in Brampton on August 2nd, Dr. W. L. Robinson of Toronto spoke on "Classification, Pathology, Diagnosis and Treatment of Diseases of the Thyroid". Dr. R. D. Rudolf of Toronto spoke on "Cardiac Stimulants".

The Ontario Medical Society met at Beaverton on August 2nd, Dr. H. B. Anderson of Toronto addressed the meeting.

The Victoria Medical Society met at Lindsay on August 3rd, Dr. H. S. Hutchinson spoke on "The Modern Treatment of Nephritis."

A meeting of the Hastings County Medical Society was held at Marmora on August 8th, Dr. Roscoe Graham of Toronto spoke on "The Surgical Aspect of the Chronic Dyspeptic."

The Peel County Medical Society met at Brampton on August 9th. The address was given by Dr. G. S. Young of Toronto, the subject being "A Discussion of the Value of the Physical Signs in the Examination of a Patient."

The Northumberland and Durham Medical Society held a meeting at Newcastle on August 23rd. Dr. W. T. Connell of Kingston spoke on "Arteriosclerosis and Hypertension."

The Norfolk County Medical Society met at Port Dover on August 28th. Dr. F. W. Hughes of London spoke on "The Relation of Literature to a Medical Career."

The opening meeting of the Hamilton and Wentworth County Medical Society, took place on Wednesday September 5th. After the business meeting the Association was addressed by Dr. Norman B. Gwyn of Toronto on "Post-operative Pulmonary Complications."

The Provincial Board of Health has issued an excellent pamphlet on the use of Insulin, this pamphlet appearing as a booklet of information respecting the free distribution of Insulin is issued by Dr. John W. S. McCullough, Chief Officer of Health, and is addressed to the Honorable Forbes Godfrey, M.D., Minister of Public Health and Labour. It only remains to be said that the chief Officer of Health, and the Minister of Public Health and Labour are to be warmly congratulated for putting the problem of treatment of diabetes so clearly before the eyes of the general practitioner. It is a pamphlet, the value of which would be difficult to over estimate and one hopes the public at large will be properly informed through the medium of the daily press just how important these activities of their public servants appear in the eyes of the medical world.

Dr. Banting, Professor of Research Medicine at the Toronto University Medical faculty visited Great Britain this summer addressing the International Surgical Congress of London, the British Medical Association meeting in Portsmouth, and the International Physiological Society Meeting in Edinburgh, also giving informal talks to the students at Guy's and other medical schools.

Dr. Edward Gallie of Toronto has been appointed Hunterian professor and lecturer at the Royal College of Surgeons in London in April 1924. The subject of the lectures will be "Living Sutures."

District No. 3 of the Ontario Medical Association comprising the Counties of Bruce, Grey, and Dufferin, held a very interesting meeting in Owen Sound on Monday, September 10th, under the auspices of the Grey County Medical Society. Dr. T. H. Middlebro, Counsellor of the District presided. During the afternoon, the following papers were given:—"Some Sidelights on So-called indigestion," by John A. Macgregor, London; "Some Serious Complications of Otitis Media and their Diagnosis," by Dr. J. K. M. Dickie, Ottawa; "The Right Iliac Fossa—A plea for care in diagnosis and treatment," by Dr. F. N. G. Starr, Toronto. At 6.30 p.m., dinner was served at the Y.M.C.A., and was immediately followed by addresses from Dr. J. F. Argue, Ottawa, President of the Ontario Medical Association, Dr. T. C. Routley, Secretary of the Ontario Medical Association, and Dr. A. A. Fletcher of Toronto, who spoke on "Insulin and Diabetes." From the point of view of attendance (there being about

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sixty present), quality of programme and interesting discussions, the meeting was one of the best yet held by the District.

The dates for the forty-fourth Annual Meeting of the Ontario Medical Association have been fixed for June 17th, 18th, 19th and 20th, 1924, when a joint meeting with the Canadian Medical Association will be held in Ottawa under the auspices of the Ottawa Medico-Chirurgical Society.

A meeting of the Renfrew County Medical Society was held in Cobden on September 12th when addresses were given by Dr. C. S. Wright, Toronto, on "Personal Experiences in the Investigations of Chronic Arthritis," and Dr. E. J. Trow, Toronto, on "The Diagnosis and Treatment of the Common Skin Affections."

A meeting of the Northumberland and Durham Medical Society was held at Campbellford on September 13th, when a paper was given by Dr. Geo. S. Strathy on "the Differential Diagnosis of Pain in the Back."

The Annual Meeting of District No. 10 in the Ontario Medical Association, comprising the districts Kenora, Rainy River, Thunder Bay, and Patricia, was held in Fort William and Port Arthur on Friday, September 14th. The morning session was devoted to clinics and ward rounds at McKellar Hospital. Luncheon was served at the Kaministiquia Club, followed immediately by excellent addresses from Dr. A. A. Fletcher of Toronto on "Insulin and Diabetes," and Dr. F. N. G. Starr, Toronto, on "The Right iliac Fossa—A plea for care in diagnosis and treatment." The evening session was held at Port Arthur commencing with a banquet at the Shuniah Club, followed by addresses from Dr. J. K. M. Dickie, Ottawa, on "Some Serious Complications of Otitis Media and their Diagnosis"; Dr. J. F. Argue, President of the Ontario Medical Association; and Dr. T. C. Routley, Secretary of the Ontario Medical Association. One of the interesting features of the meeting was the large attendance of physicians from distant parts of the District. The day was considered to be one of the most interesting and enjoyable of the several annual District Meetings which have been held.

The members of District No. 9 of the Ontario Medical Association, comprising the counties of Algoma, Temiskaming, Sudbury, Nipissing, Parry Sound, and Muskoka, were the guests of the Sault Ste. Marie Medical Society on Wednesday, September 12th, when the following programme was presented:—Address by Dr. J. F. Argue, President of the Ontario Medical Association; "The Right Iliac Fossa—A plea for care in diagnosis and treatment," by Dr. F. N. G. Starr, Toronto; "Some Side-lights on So-called Indigestion, by Dr. John Macgregor, London; "Insulin and Diabetes," by Dr. A. A. Fletcher, Toronto; "Some Serious Complications of Otitis Media and their Diagnosis," by Dr. J. K. M. Dickie, Ottawa; "Resumé of the Past Year," by Dr. T. C. Routley, Secretary of the Ontario Medical Association, Toronto. One of the most interesting features of the meeting was the dinner at the Country Club to which ladies were invited. The Sault Ste. Marie Society are to be congratulated on the excellent arrangements which were provided to carry out one of the most delightful meetings in the history of the District.

On September 13th, the Simcoe County Medical Society met at Allandale, when an address was given by Dr. Geo. S. Young, Toronto, on "The Diagnosis and Treatment of Goitre."

Dr. R. W. Mann of Toronto addressed a meeting of the Hastings County Medical Society in Stirling on Sept. 12th, on "The Treatment of Diabetes Mellitus."

The Peterborough Medical Society met on September 20th, an address being given by Dr. K .C. McIlwraith, Toronto, on "Modern Views of the Conduct of Labour."

On September 20th, the New York County Medical Society met at Stouffville when an address was given by Dr. W. G. Cosbie on "Modern Views on the Toxaemias of Pregnancy."

On September 7th, a meeting of the Ontario Medical Society was held at Oshawa when an address was given by Dr. W. T. Connell on "Arteriosclerosis and Hypertension."

Obituary

DR. GORDON BELL

To the medical men of Manitoba, indeed of the whole West, and to many in the East the sudden death of Dr. Gordon Bell, of Winnipeg, on August 8th, came with all the shock of a personal bereavement. His whole illness, a profound infection, likely streptococcal, lasted scarcely a week. As the news spread it was remarked by one and another of his old associates that no one could have left so big a gap in medical work in the Canadian West, and none could be more sincerely mourned either for what he was or for what he did.

Born at Pembroke in 1863, he received his general education at Pembroke and the University of Toronto, and his medical education at the University of Manitoba. He was Superintendent from 1890 to 1893 of the Mental Diseases Hospital at Brandon; for a time thereafter was associated in eye, ear, nose, and throat work with Dr. J. W. Good, and gave this up in 1896 to become provincial bacteriologist and pathologist of Manitoba. He was Professor of Bacteriology and Hygiene of the University of Manitoba and Chairman of the Provincial Board of Health. He was really the father of the Manitoba Sanatorium at Ninette and a member of the Board and executive up to the time of his death.

The peculiar place he had in his profession and in the hearts of his associates may be gathered from some paragraphs of a minute passed by the Manitoba Medical Association:

"With the death of Doctor Gordon Bell there has passed from among the medical men of Manitoba the one who by the vote of all would have been named as their most eager enquirer after truth, their wisest counsellor and their kindliest man.

"To a clear, keen mind Doctor Bell added a most discriminating and retentive memory and a wonderful instinct for getting the crux of a question. From a very wide area the problems of many practices were brought to him. 'What Gordon Bell thought about it,' was the final word in thousands of difficulties. His instant diagnosis or prophetic prognosis came perhaps from a recollection of a similar condition a quarter century ago. But beyond and above his ripe experience, firm grasp of funda-

mentals, and sound judgment, there was a very rare insight that was his own peculiar possession. The very cream of all his reading and experience, and indeed of the medical experience of a good part of the Canadian West for thirty years back, was available and most freely available in him to the doctors and to the people of the province.

"Such informal consultations and discussions were a large part of his every day's work. His door was always on the latch. His formal lectures were a small part only of the grand total of his teaching. His formal duties were a small part only of his wide work. He was called to a high vocation and gave to it the whole great wealth of his being.

"What he has been to Medical Education and to better standards of practice throughout Western Canada who can estimate? He was in himself university and university extension. What it has meant all these years to have within the Medical School a teacher of such equipment and such spirit, approachable without formality by any student or physician, or any stranger at any time, giving each freely of his best, and with the kindly hospitality of a gracious host superadded, may be the better estimated now—Alas!—that his chair is empty.

"There could be no better friend or more delightful companion. He was a part of all that he had met. Nothing of interest to mankind was alien to him. A lover of nature in its every phase, a conserver of wild life, giving his life to the bettering of health, always the friend of the weak, always angry at injustice, himself always just and always kind, he was a man of the very finest mould as he was a physician of very unusual capacity and attainments."

It is well worth appending also the graceful and true editorial tribute of the *Manitoba Free Press*. A man and physician of Dr. Bell's fineness could scarcely fail of appreciation in the community at large:

"It might be truly said of Dr. Gordon Bell, whose unexpected death yesterday has put this city in mourning, that he was the most beloved physician of Winnipeg. Indeed, there is no need to bound the expression by any professional limitations. It would be entirely just to say that Winnipeg has lost its finest citizen, judging by the qualities that count: beauty of character, elevation of mind, charm of manner, kindliness of disposition and devotion to the public good.

"The beauty and worth of such a life as that of Dr. Bell's is not truly felt until it is lost. Dr. Bell had been for so long a time one of the centres of thought and action in our community that he and his services were taken for granted; it is only by the void that his going leaves that we shall begin to understand how much that quiet, unostentatious life, that character of perfect selflessness and utter devotion, that high talent dedicated to the public service, meant to this city.

"The best answer to the materialist, the cynic, the money-grubber, the scorner of public duty, the disbeliever in all motives save those that serve self-interest, are lives such as that lived by Dr. Bell. Not only are they answers to the doctrines of earth, but it is examples such as his which purify our civic life by lighting the fires which show the paths of duty and service to the generations.

"A great and—what is better far—a good man has passed on, leaving the community a memory which it will long cherish and an example that will not lack emulation by young and generous souls following in his footsteps."

JOHN CHIELE, C.B., M.D., LL.D., D.Sc., F.R.C.S. (Edin.)

Emeritus Professor of Surgery, University of Edinburgh.

In all parts of Canada the influence of the Edinburgh School has permeated the ranks of medicine. Many of our practitioners are graduates of that University; many more have pursued post-graduate studies there; and because some of our own medical schools (notably McGill) have been founded upon, and for years have closely followed, the system of medical education as developed in Edinburgh University, the majority of us owe much to that venerable institution and to the great minds who directed it. It is, then, with an uncommon interest and sorrow that we record the death, on May 29th last, of John Chiene, C.B., Emeritus Professor of Surgery.

Born in Edinburgh in 1843, he had attained the mature age of eighty years. He maintained excellent health, was ill but a few hours, and his end was peaceful. He was a man of parts and a vigorous student. In his preliminary education he excelled in mathematics winning the Ferguson and Mitchell Medals at the ages of sixteen and seventeen, respectively. He was also active in athletics and played on the school teams in football and cricket. His intimate and lasting interest in rugby was further evinced by his being elected the first President of the Scottish Football Union in 1872 and again holding that office in 1877. He graduated with honours from the Edinburgh School of Medicine in 1865. He was house-surgeon to Mr. Syme then Professor of Clinical Surgery in the Royal Infirmary. Later, 1869-78, he was associated in clinical study with Joseph Lister who succeeded Syme. During this period he was also teaching anatomy, being a demonstrator in John Goodsir's class. In 1870, Chiene began to lecture in the Extra-Mural School upon operative and systematic surgery, and the class grew rapidly from 13 to 155 students. In 1882, at the age of thirty-nine, he was elected to the Chair of Surgery in the University, a post he held until 1909.

His early success with students was now shown to be due to special personal gifts as a teacher, combined with great simplicity and earnestness, a faculty for clear exposition, and a racy and genial humour. In the wards where his clinical teaching was carried out, sympathy and kindliness of heart were characteristics that commended him both to students and patients. Along with this, however, he had a capacity for direct speaking which gained for him among the students the sobriquet of "Honest John." He was dominated by his feeling of responsibility as a teacher. His lectures were directed towards inculcating the principles of surgery with relatively little regard for changing details of operations. Another matter which receives, perhaps, too little consideration in present-day medical schools, is that he taught rather with the object of rendering his students efficient for general practice than with the view that they should become specialists in surgery. In clinical teaching, Chiene was fond of drawing the attention of his dressers to two sketches hung in the side room of his ward for their benefit, one illustrating a mother bird feeding a nestful of gaping youngsters—the wrong kind of teaching—the other representing a new-fledged chick picking up grains of corn for itself—the correct method of gaining knowledge.

He established a laboratory of bacteriology and surgical pathology in connection with the Chair of Surgery, this being the first of its kind in the United Kingdom, and although not himself a laboratory worker, he spared neither time nor money to encourage research by his junior assistants. His publications were not many. A collection of *Lectures on Surgical Anatomy*, with thirty-one plates, was published in 1878, while he was still an extra-mural lecturer, and a small fasciculus entitled *Principles of Surgery* was issued in 1882, the year in which he was elected to the Chair of Surgery. He made also occasional contributions to periodical medical literature. Those interested in Edinburgh anecdotes and in golf, cannot but be charmed with his *Looking Back, 1907-1860*.

In 1900, when local patriotism was equipping hospitals in various parts of the country to aid the forces in South Africa, he went out as the senior surgeon of an Edinburgh hospital, becoming, soon after arrival in South Africa, Consulting Surgeon to the South African Field Force.

An indication of the affectionate regard entertained for him was afforded by a dinner given in his honour in 1911, by the survivors of his numerous house-surgeons. Letters of appreciation were received from all these, save one in a distant part of the world, and out of a total of

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sixty-eight, nearly forty were present in Edinburgh to celebrate the occasion.

The funeral took place on Friday, June 1st, at the Dean Cemetery, Edinburgh, and was attended by a large gathering representative of the medical profession and general public.

Dr. C. A. Barnaby, a much respected member of the profession, died at Halifax on the 15th of August. Dr. Barnaby had practiced in several parts of Nova Scotia since 1881, but removed to Halifax some years ago, where, on account of indifferent health, he was obliged to live quietly, and to undertake but little professional work. Some months ago he found it necessary to forego all practice, but was able to go about until within a few days of his death. He was ever ready to do a good turn and enjoyed the esteem of all who came in contact with him.

Dr. J. P. Vrooman, M.P.P.—died at the General Hospital in Kingston on August 20th, 64 years of age. A graduate in medicine of the University of Toronto in 1883, Dr. Vrooman practiced in Yarker and later moved to Napanee where he has since practised. Dr. Vrooman was the Liberal member for Lennox having been elected member of the Ontario Legislation in June.

Dr. James G. Scott of Seaforth, died on August 25th in his 81st year, as the result of an accident. A graduate of the College of Physicians of Ontario in 1871, Dr. Scott had spent the most of his life in Seaforth, being one of the early settlers.

Dr. I. C. Sharp, the well known physician of Montreal passed away at Ottawa recently. For more than a quarter of a century he practiced in Point St. Charles, and was considered the doyen of local physicians. Dr. Sharp was the son of the late I. N. and Mrs. Sharpe, and was born at Studholm, in King's County, N.B. on November 25, 1856. He graduated in medicine from McGill University and was for some time house surgeon in the Montreal General Hospital. In 1885 he began a successful practice at Marysville, N.B. then the industrial centre of the late Alexander Gibson. Removing to Montreal in 1898, he resided at 545 Wellington Street for the past twenty-five years, where he built up an extensive practice, and established a wide reputation as a practitioner and consultant. He lectured in Bishop's College at the time of its amalgamation with McGill on 1905. He was buried in Fredericton, N.B.. He leaves a wife, one brother, and one sister.

Contribution to the Pathologic Physiology of Botulism.—Charles W. Edmunds and Perrin H. Long, Ann Arbor, Mich., summarize their findings as follows: There is in botulism a partial paralysis of the endings of the motor nerves going to the voluntary muscles. In some cases this curare-like action is almost complete, as in the case of the nerves supplying the neck muscles of chickens. This action will explain all of the characteristic symptoms of botulism which are motor in origin. The involvement of the phrenic nerves explains the early paralysis of the diaphragm. The effect of the toxin on the nerves to the respiratory muscles is responsible for the gradually increasing weakness of the respiration, and for its final failure, which is responsible for death under this form of poisoning. The involuntary muscle of the esophagus, stomach and intestine acts in a normal manner to epinephrin, physostigmin and other peripherally acting drugs, indicating that the symptoms, such as difficulty in swallowing, and constipation, are probably not due to an action of the toxin on structures located in the gastro-intestinal wall. The vagus nerve is also affected, as it largely loses its control over the heart rate, thus probably accounting for the acceleration of the heart described in certain of the cases of human botulism. The toxin is apparently not excreted in the urine, but may be demonstrated in the blood long after it has been injected. On the basis of their experimental work, it is recommended by the authors that in cases of human botulism, when the respiration shows signs of failure, artificial respiration be instituted—if necessary, by means of bellows and a tracheal cannula. In dogs this procedure has given promise of success. The careful administration of physostigmin is also recommended.—*Jour. A. M. A.*, Aug. 18, 1923.

Isolation of Bacterium Pneumosintes from Influenza Patients.—From the nasopharyngeal secretions of six patients in the early hours of typical, uncomplicated epidemic influenza during the epidemic of January and February, 1923, Peter K. Olitsky and James E. McCartney, New York, observed in five instances an active agent, pathogenic for rabbits. On culture of the filtered secretions and of the lungs of rabbits inoculated intratracheally with these materials, four new strains of *Bacterium pneumosintes* have been isolated, one directly from the secretions and three from the rabbits' lungs. All the strains have been identified as agreeing with those of the 1918-1919, 1920 and 1922 strains in morphology, cultural properties and serologic reactions. Agglutinins against *Bacterium pneumosintes* were demonstrated in six of ten patients who have recovered from an influenzal attack.—*Jour. A. M. A.*, Sept. 1, 1923.

Book Reviews

"Orthopedic Surgery". By Sir Robert Jones, K.B.E., C.B., Ch.M. Liverpool, F.R.C.S., England, Ireland and Edinburgh, F.A.C.S., (U.S.A.), and Robert W. Lovett, M.D., F.A.C.S., John B. Buckminster Brown, Professor of Orthopedic Surgery in Harvard University. Large Octavo. Pages 669. Illustrated with 712 Engravings. Price $9.00. William Wood and Company, New York, 1923.

From the names of the illustrious authors, the size of the volume, and the number of illustrations, one would naturally be led to anticipate a work containing the last word on this subject, so far as our present knowldge is concerned, and in most respects the reader will not be disappointed.

It is pointed out in the preface that the term "orthopedic surgery has ill-defined boundaries." While originally intended to cover that branch of surgery dealing with the deformities of children, it has gradually been extended to include deformities in general, but of recent years, and perhaps more particularly since the war, it has been again greatly extended so that the present volume "includes subjects which group themselves under six headings, viz:—(1) Joints and their affections; (2) Bones and their affections; (3) Disturbances of the neuro-muscular mechanism; (4)Congenital deformities; (5) Static and other acquired deformities; (6) The principles and details of apparatus."

The various chapters dealing with traumatic affections of joints, tuberculosis of joints, developmental diseases of bone, spastic paralysis, lesions of the lower neuron (spinal and motor centres), muscle training, congenital deformities, torticollis, congenital dislocation of the hip and other joints, club foot, lateral curvature of the spine, and the principles of apparatus are all remarkably complete.

It is to be regretted that the sections dealing with tumours of bone, and with malunited fractures are not in keeping with the general excellence of the work, and as it was obviously not the intention to deal with recent fractures the reference to the proper method of reduction of Colles' fracture might better have been eliminated, since "a firm grip with a slight traction and twist of the wrist completely reduces the deformity" can hardly be said to convey much accurate instruction.

While in general the illustrations are excellent, many of the reproductions of roentgenograms are by no means clear, and some of the illustrations depicting surgical procedures completely lose their value through too much "drapery." E. R. S.

A Text-Book of the Surgical Dyspepsias. By. A. J. Walton, M.S., M.B., B.Sc. (Lond.), F.R.C.S., (Eng.) Surgeon London Hospital, Late Hunterian Professor Royal College of Surgeons. 728 pages, illustrated. Edward Arnold & Co., London, 1923. Price 42s net.

The author has succeeded in producing a well written volume dealing with the dyspepsias, which may be classed as surgical, arising from pathological conditions of the stomach and duodenum, the liver and bile passages, the pancreas, the appendix, and general visceroptosis. The conclusions as to whether medical or surgical treatment is indicated are based on sound principles, and the various surgical procedures advised are such as will commend themselves to advanced surgical opinion.

While the work does not pretend to cover all the details of operative abdominal surgery, the various operations which have appealed to the author as being most useful are described at some length, and the merits and otherwise of different types of operations are discussed. The illustrations are somewhat diagrammatic, but in general serve their purpose excellently. Illustrative cases of some of the rarer conditions are described at length. The book will well repay careful reading, and should create a well merited demand owing to the sane and safe, though not too conservative, nature of the views expressed. E. R. S.

The Standard Methods of Milk Analysis of the American Public Health Association and the Association of Official Agricultural Chemists. Fourth edition. Published by the American Public Health Association.

The laboratory methods outlined in this book are accepted as standard by health departments and others engaged in the analysis of milk throughout the North American continent. The text is kept up-to-date by frequent revision. Previous editions have contained only bacteriological methods and the fourth edition is especially welcome because it contains for the first time methods for both chemical and bacteriological analysis of milk. The bacteriological methods are essentially the same in the fourth as in the third edition, only a few minor changes being noted.

The methylene blue reduction test is included for the first time as a provisional method and may prove of value in the rapid approximation of the quality of milk, and is a test which can be made without trained laboratory men or extensive laboratory apparatus. Slight changes are noted on page 14 in the directions for estimating the plate count from the microscopic count. The stringency of the estimation in the fourth revision is increased over the previous edition in the ratio of 4 to 5. Also it is now estimated that the official plate count normally averages 1/4 of the total number of individual bacteria present, which figure appeared as 1/5 in the third edition.

The addition of methods for the chemical analysis of milk makes the fourth edition of *Standard Methods* the most valuable yet published. A. J. S.

Text-Book of Ophthalmology. Fuchs. 7th English edition. 1,080 pages, 475 illustrations. J. B. Lippincott Co., Philadelphia, London and Montreal. Price $9.00.

The average life-time of man does not measure the years that "Fuchs" has stood as a guide for students of ophthalmology in nearly every land. Now comes this seventh edition in English, measuring up well to the standard set by its predecessors.

Some changes in arrangement of the subjects discussed have been made; these are of minor importance, though they make for greater convenience in a search. The chief point is that in the re-writing of so much of the text, full coznizance has been taken of all the recent investigations in ophthalmology, so that one may depend upon finding those advances discussed, which are by experience proven worthy. Indeed the new edition will keep its place as the outstanding authority in this specialty.

There is no division of the old book which has not been carefully gone over, and revisions made where the editor deemed necessary. Especially is this so in the chapter on motor anomalies, in which Dr. Duane is so personally interested. Also the chapter on the surgery of the eye-region has been revised and en-

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larged, so that in every way the volume deserves its title.

The attempt to keep the text as originally set down by Fuchs is very creditable to the editor. Altogether one can hardly conceive how a more satisfactory compilation of all that is trustworthy in this branch of medicine could be made. The book-making is of the very best; the paper and printing are perfect, so that reading is very easy. The addition of new material to the successive editions is making the volume a heavy one, and some day we expect to see our old and tried friend appearing in two volumes.

F. C. T.

Essentials of Surgery. A textbook of Surgery for Student and Graduate Nurses and for those Interested In the Care of the Sick. By Archibald Leete MacDonald, M.D., The Johns Hopkins University. Formerly in charge of the Department of Anatomy, University of North Dakota. Small 8vo, 288 pages with 49 illustrations, Second Edition, Revised. J. B. Lippincott Company, Philadelphia, London and Montreal. Price $3.00.

This small volume offers a very fair summary of surgical principles including a brief reference to gynecological conditions Each section has a list of suggested demonstrations which should be of value to instructresses in emphasizing important points, and in addition there is a fairly complete glossary.

It is to be regretted that the author has not adhered to the usual division of the abdomen into four quadrants, but has introduced a diagram illustrating nine divisions. The term "lumbar region of the abdomen" is neither sound surgically, nor anatomically.

E. R. S.

"Mistakes and Accidents of Surgery." By Harold Burrows, C.B.E., M.B., B.S. (Lond.), F.R.C.S., Assistant Surgeon, The Royal Portsmouth Hospital. Demy 8vo., pages VIII—470. Price 10s-6d net. Bailliere, Tindall & Cox, Covent Garden, London.

This is at the same time one of the most readable and instructive books which has come to the reviewer's desk for a long time, and the author is to be congratulated on the result of his labours.

The various parts of the body are considered in order, with extended reference to the various mistakes and accidents which may, and do, occur in the surgery thereof. The work is eminently practical, being based, as it is, on those errors which have occurred either in the author's own experience, or of which he has personal knowledge.

It is very easy for the reader in the calm and quiet of his own library to reflect that many of the accidents here recorded could not possibly occur in his own work, and to experience a sense of amusement at what appear to be the evident short-comings of others, but the fact remains that these mistakes and accidents have taken place in the hands of competent men, and it would therefore appear that there is no surgeon who can fail to be materially benefitted by being forewarned as to the disasters which may take place in his daily work.

E. R. S.

"The Transactions of the American Surgical Association." Volume the Fortieth. Edited by John H. Jopson, M. D., Recorder of the Association. Pages 675, illustrated. For sale by William J. Dornan, Philadelphia, 1922.

For some years now this volume has been described as giving a most admirable bird's-eye view of almost all that is best in American surgery during the preceding year, and while many of the articles have appeared elsewhere, it is of distinct value to have them collected between the covers of one volume.

The present volume includes the papers presented at the annual meeting of the Association in May, 1922. The Presidential Address by John M. T. Finney of Baltimore on "The Opportunities and Responsibilities of the Surgeon" is a masterly presentation of the subject. The following 150 pages are occupied with discussions of various aspects of the cancer problem by some ten surgeons of continental reputation. Nine articles on surgical lesions of the stomach and duodenum occupy some seventy pages, while thyroid surgery is referred to in only two articles, thus contrasting with the large space devoted to this subject in the previous volume.

Of special interest to the readers of the *Journal* will be the articles on "The Secondary Manifestations of Malignant Disease" by Alexander Primrose, C.B., M.D., C.M., "Experience in Surgical Treatment of Unilateral Pulmonary Tuberculosis" by Edward Archibald, M.D., and "Cecal Atony and Mobile Cecum" by F. N. G. Starr, M.B. (Tor.) and Roscoe R. Graham, M.B. (Tor.)

An article of outstanding interest to all surgeons is that on "The Limitations of the Ochsner Treatment in Certain Cases of Suppurative Peritonitis" by John H. Jopson, M.D., and Damon B. Pfeiffer, M.D.

E. R. S.

Treatment of the Neuroses. By Ernest Jones, M.D., M.R.C.P. 233 pages, price 12s-6d. Published by Bailliere, Tindall and Cox, London, 1920

After reviewing the last book by Ross, one cannot but notice the different viewpoints of the two writers, for while Ross sees most of his cases as neurasthenias, with a few hysteria and compulsion neuroses added, Jones on the other hand, is imbued with the hysteria behind his cases and devotes the greater part of his book to this subject.

The wonderful power that Ernest Jones has over the English vocabulary makes his book difficult reading, and while he has slightly curbed his Freudian persuasions, yet he is so strongly influenced by the main laws of that psychological school, that one feels he is striving for a lost cause.

The book is of interest to those who enjoy reading his clever presentations, but is not of the same value to the practitioner as is the accompanying volume of Ross.

G. W. H.

The Clinical Examination of the Nervous System. By G. H. Monrad-Krohn, M.D., M.R.C.P. Second Edition. 148 pages, 33 illustrations and 4 plates. Price 6s net. Published by H. K. Lewis & Co. Ltd. London, 1923.

This short concise manual appears in its second edition. It is slightly improved by several plates and by the addition of a little more subject matter. It is the best short manual on this subject to be had, and is suitable for students and physicians who require an easy aid to examination.

G. W. H.

The Common Neuroses, Their Treatment and Psychotherapy. By T. A. Ross, M.D., F.R.C.P. (Edin.) 256 pages. Price 12s-6d net Published by Edward Arnold & Co., London, 1923.

Considering the great number of books on functional nervous disease which have appeared the last few years, of which, one must sadly add, few are in the least suitable for the general practitioner, as they are filled with terms that the writers themselves can hardly explain, it is with a sense of pleasure that one reads this new volume. Influenced by that great mas-

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ter mind of neurology, Déjerine, Ross has produced a book that is useful and interesting. True he is wedded to the term neurasthenia, which is almost enough to kill any interest in the medical world, but on the other hand, he has given a new outlook to treatment in the large space that he has allotted to it in the book. This book is practical, and is well worth reading.

G. W. H.

Books Received

Practical Dietetics—Alida Frances Pattee, 687 pages, fourteenth edition. Price $2.60. Publisher, A. F. Pattee, 134 South First Ave., Mount Vernon, New York.

Collected Papers of the Mayo Clinic—By Mrs. M. H. Mellish. Vol. XIV. 1394 pages, 488 illustrations. Price $13.00 net. Publishers, W. B. Saunders Company, Philadelphia and London. Agents: The J. F. Hartz Co. Limited, Toronto.

The Mortality Experience of Industrial Policyholders—A Contribution to the Public Health Movement in America by a number of Insurance Companies. 150 pages.

The Effects of Radium Upon Living Tissues—By Sidney Forsdike, M.D., B.S. 72 pages, 42 illustrations. Price 5s. net. Publishers, H. K. Lewis & Co. Ltd., London.

A Clinical Guide to Bedside Examination—By Dr. H. Elias. 135 pages. Publishers, Rebman Company, New York.

International Clinics—Vol. II., by Henry W. Cattell. 304 pages, illustrated. Thirty-third series, 1923. Publishers, J. B. Lippincott Company, Philadelphia, London & Montreal.

Colonic and Duodenal Lavage—With a suggested Improvement in the Plombieres Treatment, by Capt. J. T. Ainslie Walker, R.A.M.C. 12 pages and 2 illustrations. Price 1s. net. Publishers, H. K. Lewis and Co. Ltd., London.

Physiotherapy Technic—by C. M. Sampson. 443 pages, 85 illustrations. Price $6.50. Publishers, C. V. Mosby Company, St. Louis, U. S. A.

Hygiene and Public Health—by Louis C. Parkes, M.D., D.P.H., and H. R. Kenwood, C.M.G., M.B., F.R.S. Edin., D.P.H. Lond. Seventh edition. 783 pages, 90 illustrations. Price 20s. net. Publishers, H. K. Lewis & Co., Ltd., London.

The Ophthalmic Year-Book—by Edward Jackson and William H. Crisp. Vol. XIX, 1923. 390 pages. Publishers, The Ophthalmic Publishing Company, Chicago, Ill.

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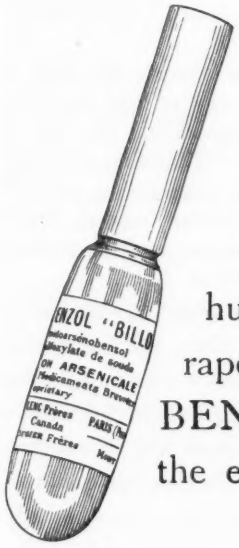

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